# Gas Journal

VOL. 286. 108th YEAR. LONDON, JUNE 27, 1956. No. 4850 PRICE 1/6



CHNOLOGY DEPT.

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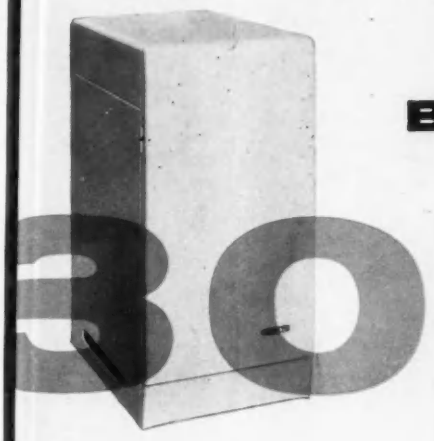


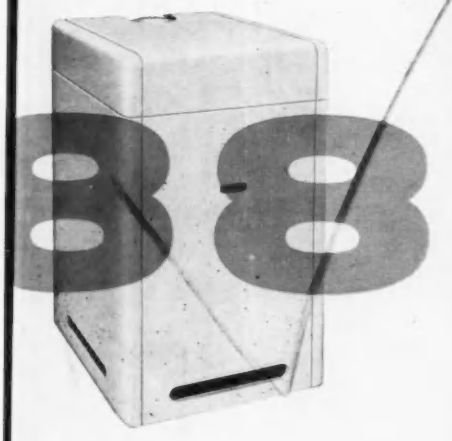


**Before you turn over**

May we tell you about two new 'Potterton' Gas-Fired Boilers that you will soon be meeting — the 'Diplomat' 30 (anticipated output 30,000 B.Th.U/hr.) and the 'Diplomat' 88 (anticipated output 88,000 B.Th.U/hr.). Like the 'Diplomat' 44 these two new boilers are neat and unobtrusive in design, and, apart from the slightly greater width of the '88', occupy the same space as the '44'. They offer the same facilities for easy maintenance, the same foolproof automatic control, the same choice of bower-barffed or 'glass'-lined waterways for soft-water areas, and, of course, the same high efficiency.

With the introduction of these two new boilers, the 'Diplomat' range will cover the hot water and central heating requirements of most households. You may recommend them with confidence.

***The 'Diplomat' Gas-Fired Boiler***

**A MODEL OF SELF-CONTROL**

***Available in white • cream scarlet and viridian green***

THE 'DIPLOMAT' GAS-FIRED BOILER

| | Max. Gas Rate B.Th.U/hr. | Max. Heat Output B.Th.U/hr. |
|---|---|---|
| DIPLOMAT 30 | 40,000* | 30,000* |
| DIPLOMAT 44 | 55,000 | 44,000 |
| DIPLOMAT 88 | 110,000* | 88,000* |

*ANTICIPATED

POTTERTON GAS FIRED BOILERS DE LA RUE

THOMAS DE LA RUE & CO. LTD.
(Potterton Division), 20/30 Buckhold Road, London S.W.18.

# GAS METERS

*D1—200c.ft. Approved by*
*Ministry of Fuel & Power*

**Milne (Edinburgh) Ltd.**

MILTON HOUSE WORKS
MILTON STREET
EDINBURGH · 8

LEEDS BRANCH · MIDLAND METER WORKS · VICTORIA ROAD

**Illustration shows a 10" Stroke Vertical Reciprocating Gas Compressor, after being subject to a rigid test in our works, loaded ready to leave for installation on site. This Compressor is driven by a variable speed electric motor, and has a capacity of 200,000 cubic feet gas per hour, running at 416 r.p.m.**

In the extensive Mainlaying programmes now being carried out, the experience and technical skill of the Norwest Construction Company will be found a considerable asset. The number of large main-laying contracts now being handled by Norwest in different parts of this country is a fact which tells its own story of competitive tendering and 100% efficient work. Call in the "Norwest" for your next contract.

THE **MAIN** LAYING PEOPLE NORWEST

NORWEST CONSTRUCTION CO. LTD., LIVERPOOL, 21 • CIVIL ENGINEERING CONTRACTORS

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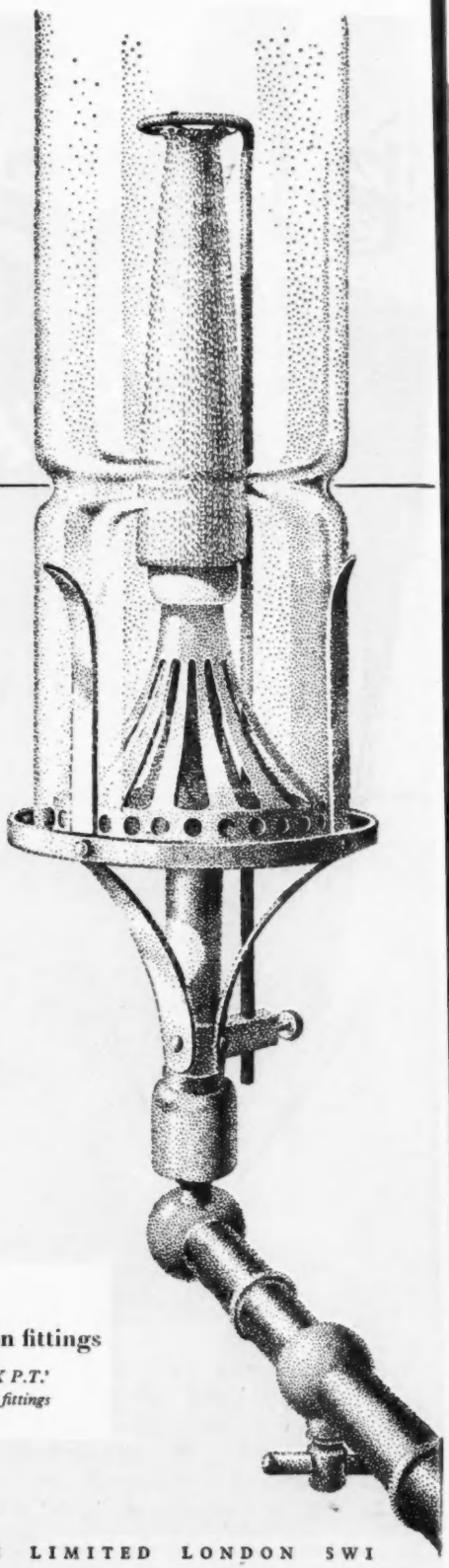
## THE PROGRESS OF GAS

# 1887



CLAMOND, in 1882, hung baskets of calcined magnesia over the hot, almost non-luminous flame of a Bunsen burner. The magnesia gave off a powerful incandescent light. This and the work of other experimenters in this field was the origin of a series of experiments by Dr. Auer von Welsbach, leading in 1887 to his first incandescent gas mantle.

Welsbach's mantles were silk or cotton envelopes impregnated with a mixture of rare salts obtained from monazite sand. The light they gave was bright and steady—the greatest advance in gas lighting since Murdoch's first experiments nearly a century before.

The first Welsbach mantles were supported by a steatite bar and hoop. Later mantles, such as the one illustrated, sat on a fork of steatite. They could not at first be inverted to throw the light downwards; but that problem was solved within the next ten years or so.

*Issued by Imperial Chemical Industries Limited for the interest of the gas industry—an important user of*

**I.C.I. copper tubes, capillary and compression fittings**

*Including 'KUTERLON' underground copper tubes, 'INTEX P.T.' capillary fittings, 'CONEOR' and 'INSTANTOR' compression fittings*

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IRON & STEEL *PRESERVATIVE* PAINTS

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# VICTAULIC

## JOINTS for grooved or shouldered pipes

**A positive joint with a valuable amount of angular and longitudinal flexibility.**

**Rapidly fitted with an ordinary spanner and can be conveniently used in confined spaces.**

**Catalogue on request, kindly state whether grooved steel, shouldered steel, or cast-iron pipes.**

**Sizes from 1" to 77" diameter.**

FLEXIBILITY

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## COUPLINGS for plain-ended pipes

Viking Johnson Couplings for plain-ended pipes, whether of steel, iron, or other material.

Angular deflections up to 6°. Accessories can be supplied for completing internal and external protection.

Sizes up to 100"; also 'Junior' Couplings for ½" to 2" Pipes.

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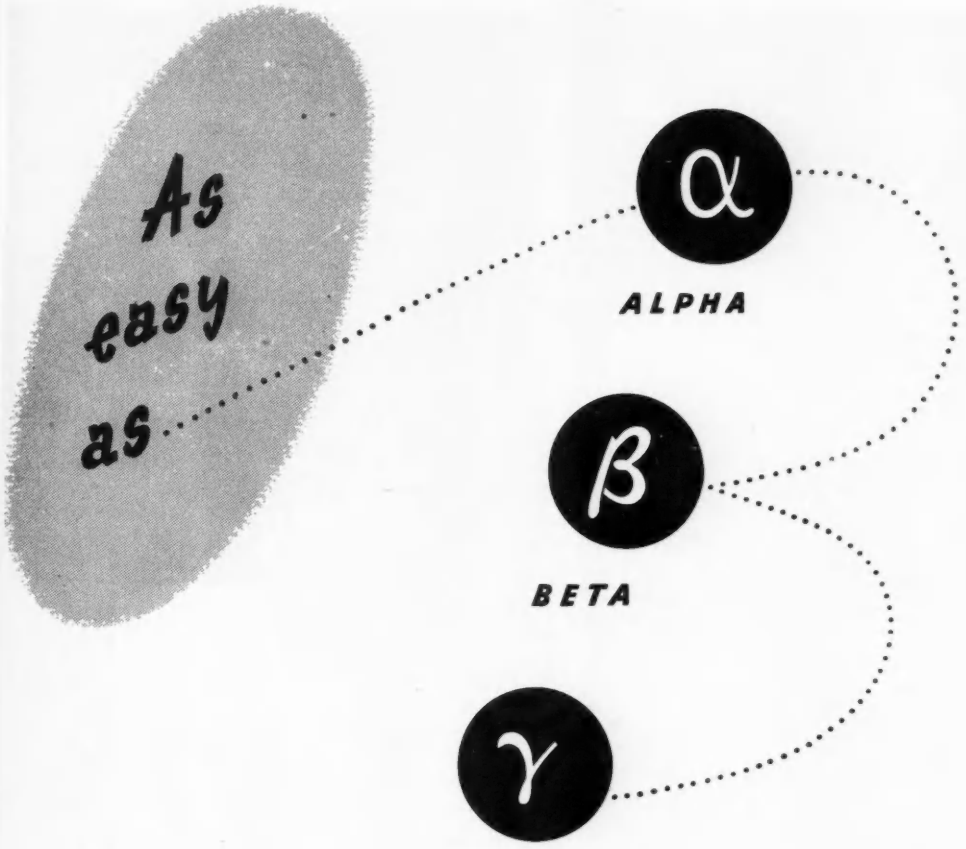


***GAMMA* RAY examination of welded work is fully catered for, of course, by Oxley's, whether in shop work or on site erection.**

**Their static and mobile plants constitute the fullest and most up-to-date equipment available.**

**All enquiries for this service will have immediate and thorough attention.**

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# Service & Appliance Governor

A general-purpose Low Pressure Governor with *'a thousand-and-one'* uses within the Gas Industry.

To suit inlet pressures up to 22-inch W.G.: outlet pressure 2½-inch W.G. (adjustable).

SIZES ¾" TO 2"

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LOW PRESSURE

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THE JAGUAR OF THE ECURIE ECOSSE RACING STABLE, owned and managed by David Murray of Edinburgh, by their many international successes aptly express an outstanding feature of A. & M. Meters . . .

*Photo by courtesy of "The Motor".*

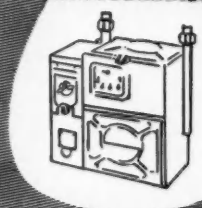
'In the picture' with A. & M.

# It's trouble-free running that does it!

Trouble-free running is indeed an outstanding feature of the current series A. & M. Meters with the "S" Mechanism. Sound design, robust construction, precise assembly and rigid inspection all add up to a new standard of trouble-free operation.

The illustration shows the A. & M. D.1 200 c.ft. "S" type coin meter for 1/- only—simpler and less expensive than the optional which is also available.

THE MINIMETER is the famous SMALL SCOTCH that gives Trouble-Free Running in most compact form



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GAS METER & INSTRUMENT MAKERS

NEW GRANGE WORKS, EDINBURGH, 11, and at London and Manchester.

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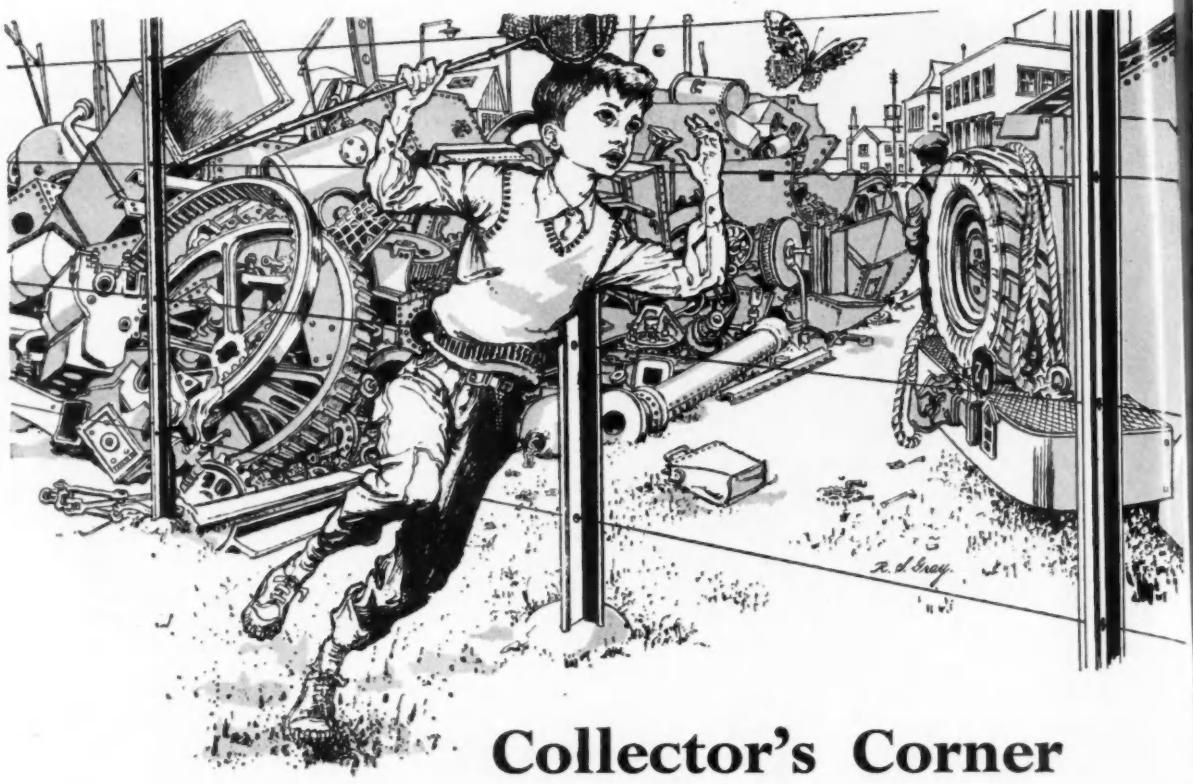

# Collector's Corner

A Painted Lady perhaps . . . what a prize for a youthful collector! But the obsolete machinery and metal scrap in the factory yard is a collector's item, too—for an organisation like Thos. W. Ward Ltd. who have the facilities to handle it on a large scale.

Scrap metal accounts for more than half the metallic charge fed into Britain's iron and steel furnaces. Much of this passes through Wards' depots where mountains of metal are sorted and processed every day.

In these modern times, scrap has become an industry itself, and, as in many other fields Wards are in the forefront of the industry.

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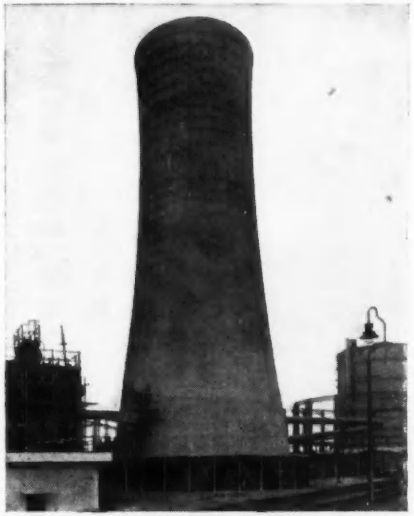
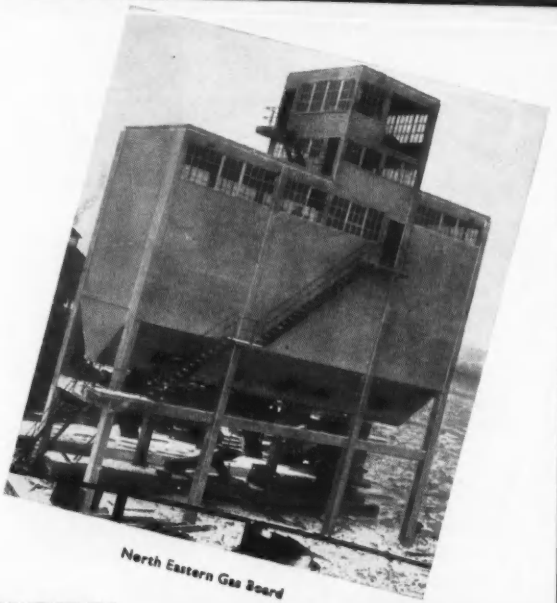
North Western Gas Board



North Thames Gas Board



North Eastern Gas Board

*Recent*

***CONTRACTS FOR THE GAS INDUSTRY***

*by*

# CROWLEY RUSSELL

## & CO. LTD.

CIVIL ENGINEERING
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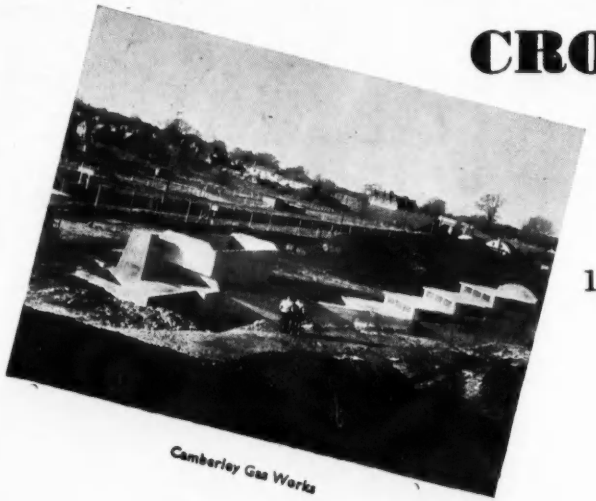

Camberley Gas Works

South Eastern Gas Board

# HIGH GRADE SLOT AND ORDINARY METERS

*I.G.E. AND HIGH CAPACITY LISTS*

**Nothing but the best materials and workmanship used in their manufacture**

**R. LAIDLAW & SON (Edin.) Ltd.**

SIMON SQUARE WORKS, EDINBURGH

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*Repairs—Parts Supplied*

# The latest and best in PORTABLE BELT CONVEYORS

**Belt.** Of best quality Grade "A" long staple cotton canvas duck with tough rubber cover to suit the duty in question—belt cleated if required.

**Support Rollers.** All of the ball bearing type with dual synthetic rubber oil and dirt seals and oil reservoir lubrication—return rollers have tough rubber discs designed to clear returning cleats and to assist in keeping the belt clean.

**Protection of Working Parts.** The motor drives and ball bearings are carefully positioned and really well protected.

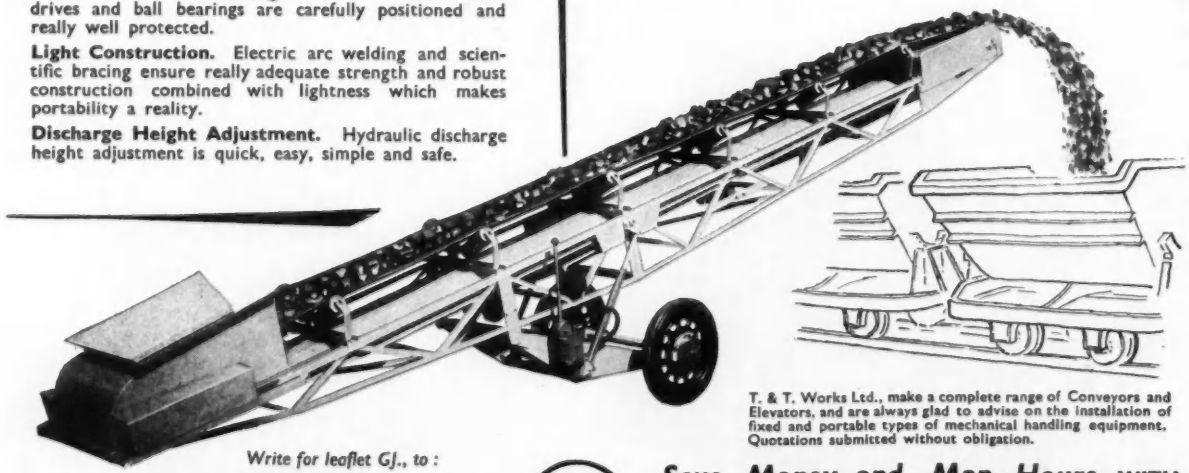
**Light Construction.** Electric arc welding and scientific bracing ensure really adequate strength and robust construction combined with lightness which makes portability a reality.

**Discharge Height Adjustment.** Hydraulic discharge height adjustment is quick, easy, simple and safe.

WITH AN

## Unbeatable Specification

These conveyors are available in a full range of lengths and widths. Ultra light editions are also made, and are particularly suitable for oxide handling duties.



T. & T. Works Ltd., make a complete range of Conveyors and Elevators, and are always glad to advise on the installation of fixed and portable types of mechanical handling equipment. Quotations submitted without obligation.

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**London Office: 39, Windsor House, 46, Victoria Street, London, S.W.1. Phone: ABBey 6085.**

T&T

*Save Money and Man-Hours* WITH

**CONVEYORS AND ELEVATORS**

*Photograph by Courtesy of the South Eastern Gas Board, Dover and Woodall-Duckham Construction Company Ltd.*

Development at the Dover Works of the South Eastern Gas Board is yet another fine example of co-operation between experienced planners and engineers, and the resources of an organisation with exceptional works facilities. The supply of structural steelwork has been Walker Bros. contribution to the new Woodall-Duckham Installation of Continuous Vertical Retorts at Dover. These retorts are capable of carbonising 821 tons of coal per day, thereby producing some 13 million cubic feet of gas. We are highly organised to tackle any structural steelwork problem, from design to erection and nearly ninety years of specialist knowledge and experience is at your disposal.

*Established 1867*

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*Structural Engineers*

*if it can be built in steel—we can build it*

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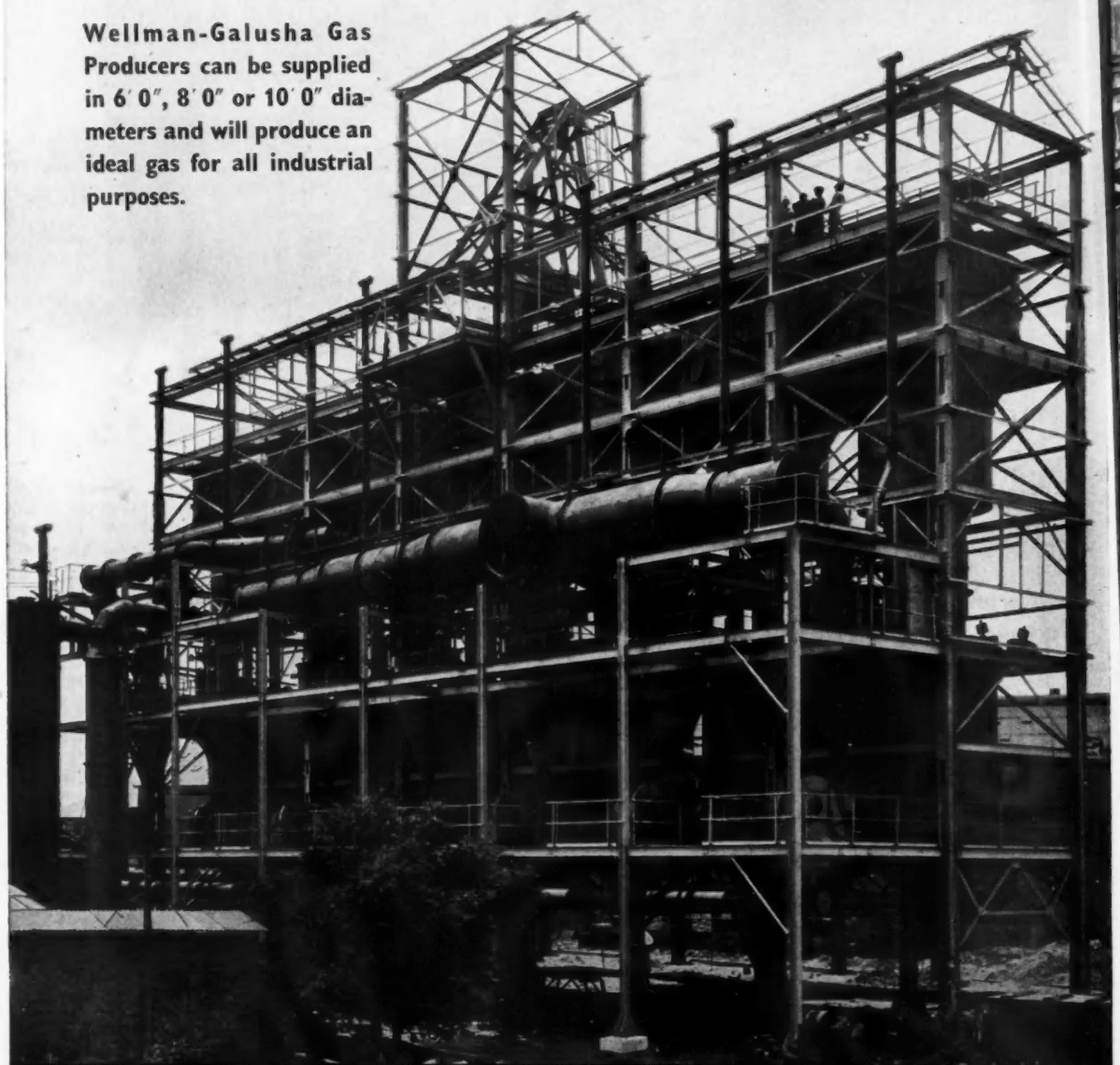
# Wellman-Galusha Gas Producers

**A battery of seven 10′ 0″ diameter Wellman-Galusha Gas Producers, for gasifying Natal anthracite coal—under construction at Vereeniging, Transvaal, South Africa. The installation is one of the most extensive gas producer plants to be erected initially as one battery in the British Commonwealth.**

**Wellman-Galusha Gas Producers can be supplied in 6′ 0″, 8′ 0″ or 10′ 0″ diameters and will produce an ideal gas for all industrial purposes.**



THE WELLMAN SMITH OWEN ENGINEERING CORPN. LTD.
PARNELL HOUSE, WILTON ROAD, LONDON, S.W.1 WORKS: DARLASTON, SOUTH STAFFS.

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OXIDE
FOR THE
GAS INDUSTRY
The material offered is our own manufacture, and is of the following composition:—
Moisture ... ... ... ... ... 38% (loss on heating at 212 F)
63%-65% (Total iron calculated as Fe. O, 3H.O on the dry basis)
Ferric Hydrate
The following allowances will be made in the case of any deviation from the above specification:—
For each complete 1% Moisture in excess of 38%
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6d. per ton allowance.
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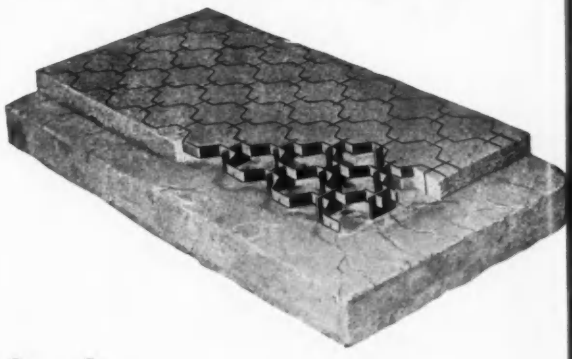
# flaws in your floors?

Intensified production outputs are subjecting floors of factories and works to heavy loads, vibration, and heat are breaking them up, bringing an added burden for managements. See for yourself how HEXMETAL strengthens concrete floors.



The HEXMETAL mats are laid and filled with concrete on top of the existing broken flooring, giving a trouble-free "pre-cracked" surface! There are many uses for HEXMETAL—almost certainly in *your* works, it will serve a valuable purpose. Write us for all the . . . news on

**HEXMETAL**

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The special MBL range of Capillary Fittings for copper gas piping ensures neat, efficient and permanent joints. Made from $\frac{1}{8}$" diameter to BSS. 864, they are specially recommended for use with MBL Copper Tubing made to BSS. 659. We are always pleased to offer advice and full details upon request.

**MBL**

**CAPILLARY FITTINGS & COPPER TUBES**

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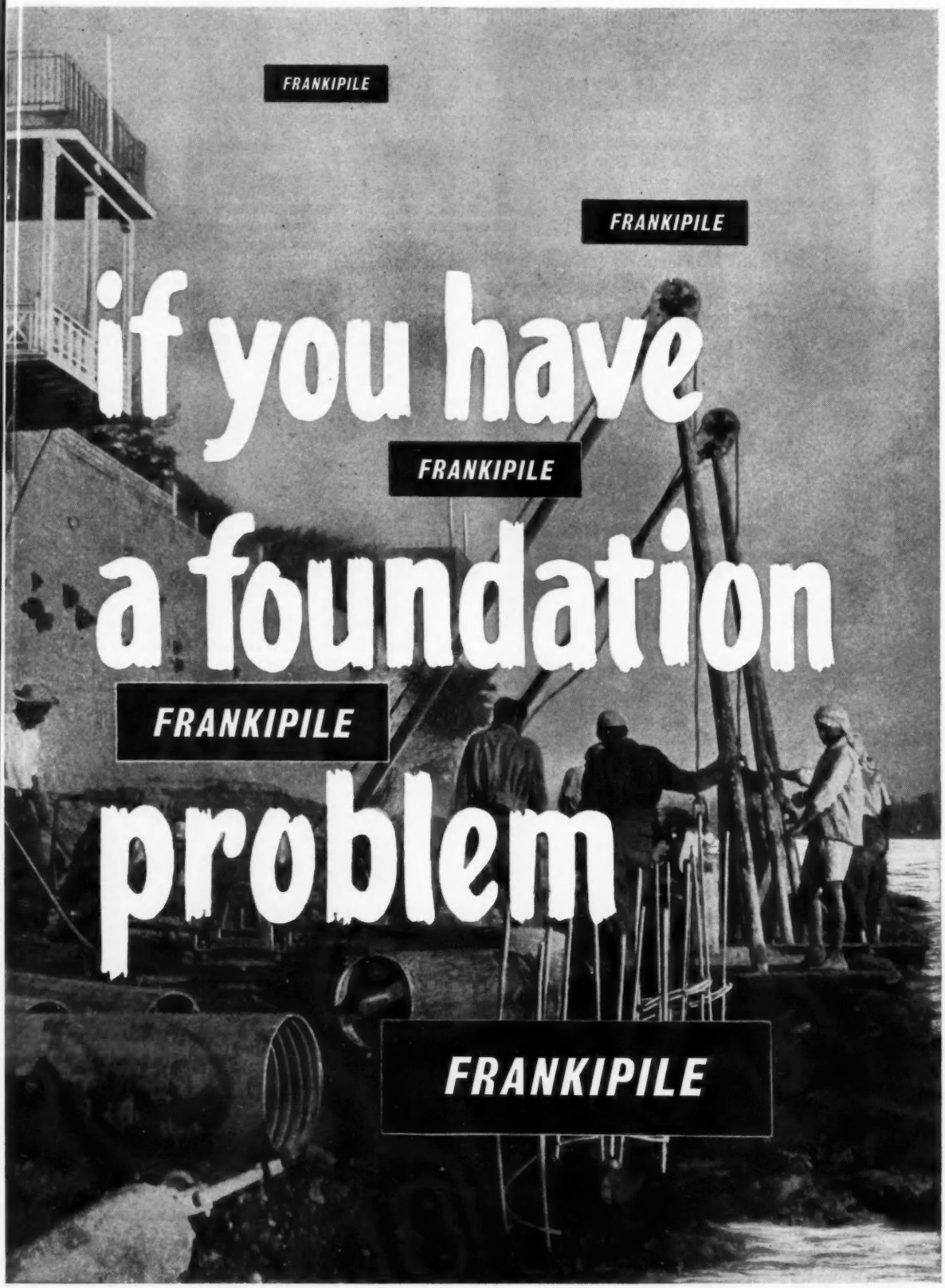
*Telephone:* CENTRAL 2532. *Telegrams:* "MINT, BIRMINGHAM 18"

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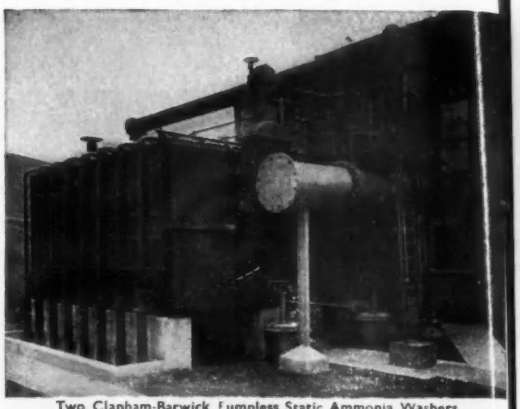
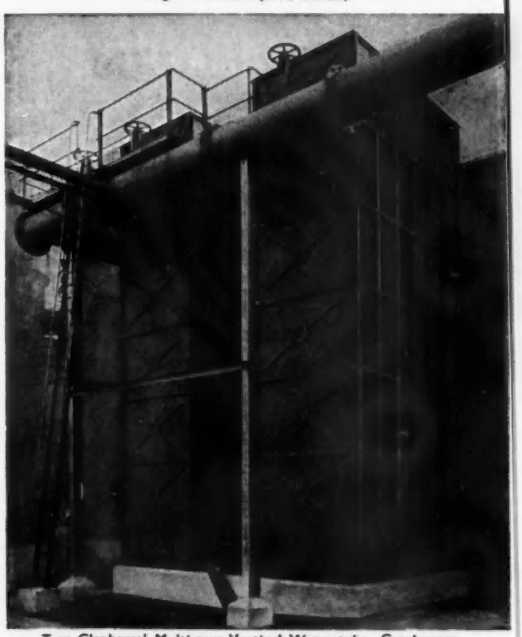
# CLAPHAM
## INSTALLATIONS AT BRADFORD



Two Clapham-Barwick Pumpless Static Ammonia Washers

Internal deck level view of the Purifier Installation. (Eight 45 Feet Square Boxes.)



Two Claphams' Multi-pass Vertical Water-tube Condensers.

For over 100 years we have been serving the Gas Industry and the illustrations show equipment installed for the North Eastern Gas Board at Birkshall Works, Bradford.

*Manufacturers of*

- Condensing Plant
- Tar Extractors
- Washers (Pumpless Patent)
- Oxide Purification Plant
- Boxless Purifiers (Prov. Pat.)
- Liquid Purification Plant
- Mechanical Handling Plant
- Coke and Pan Ash Washers
- Purifier Control Valves
- Gas Pre-Heaters
- Briquetting Plants
- Refractory Brick Making Plant
- Special Pipes and Connections in cast iron and steel

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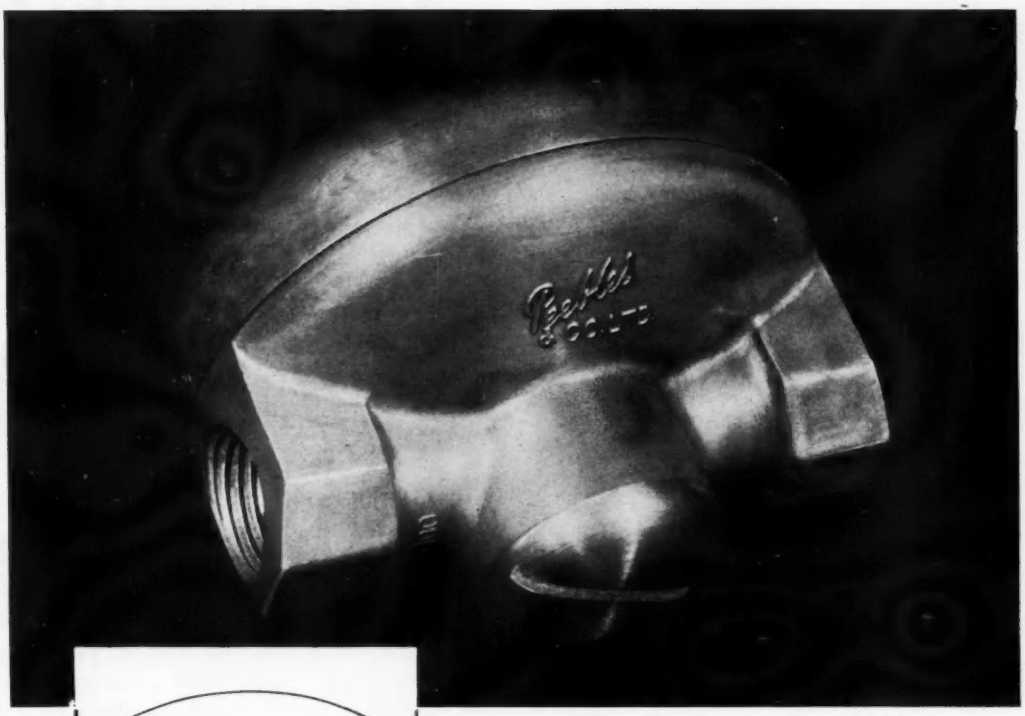
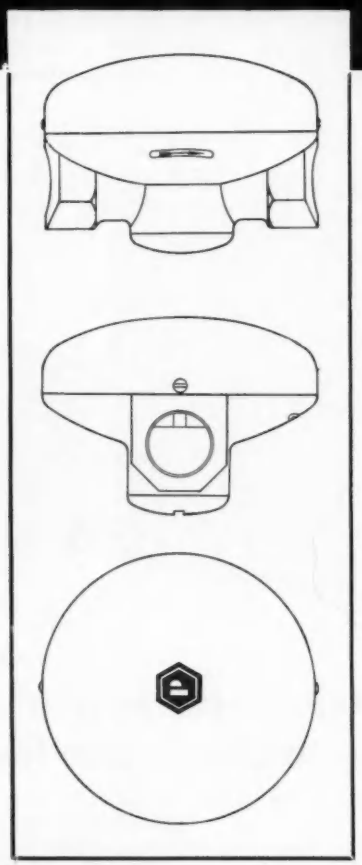
MAKERS OF GAS WORKS EQUIPMENT SINCE 1837
**KEIGHLEY · YORKS** Tel: 2787-2788-Grams: 'Clapham Bros. Keighley'



# BEST FROM EVERY POINT OF VIEW

The "Fig. 100" Appliance Governor is exceptional, not only in smooth exterior appearance, but also in its internal design, and its performance. Pressure die cast for close grained metal, designed and precision-made for stable performance and minimum maintenance costs, **it gives excellent response to every demand made upon it.**

*Write for full particulars.*

## The FIG. 100 by PEEBLES

**PEEBLES & CO., LTD., TAY WORKS, WEST BOWLING GREEN STREET, EDINBURGH, 6**

Steel Bunkers and Chimneys at Power Stations and Works are usually lined with GUNITE which withstands abrasion and chemical attack without adding seriously to the weight.

# GUNITE

## puts longer life into Bunkers

The Gunite process, developed by the Cementation Co., Ltd. has a successful record of over 25 years as a facing for both new and dilapidated structures.

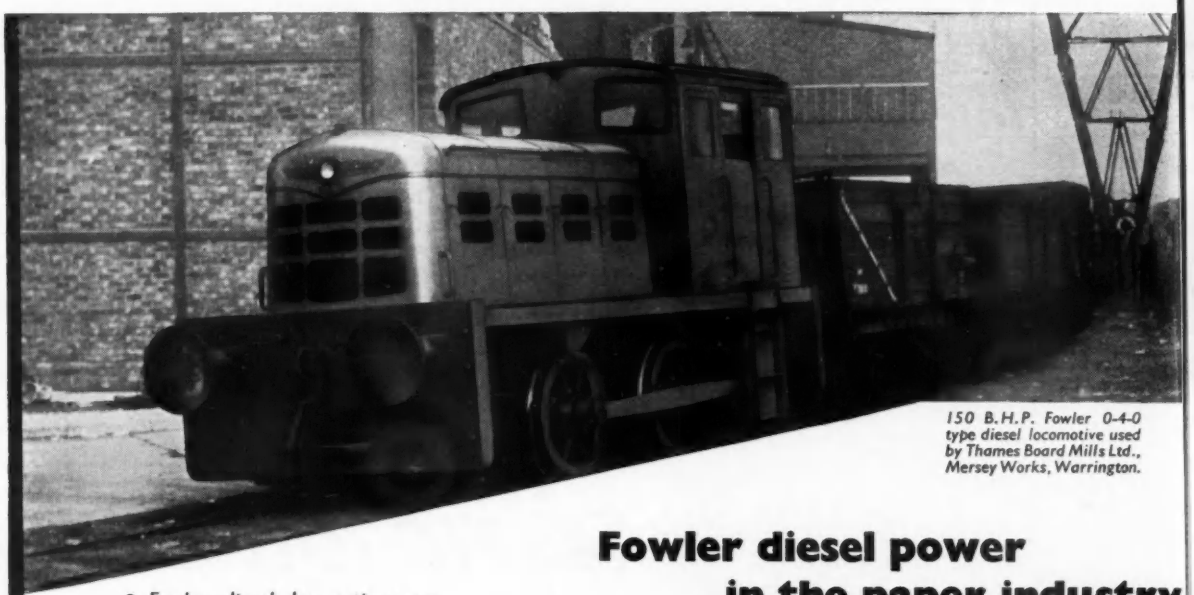
It is water, weather, and fireproof, and has great mechanical strength and hardness. Its adhesion to concrete is greater than the strength of the concrete itself.

*Write for your copy of the Gunite booklet which illustrates and describes its characteristics and applications for factories, chimneys, wharves, water towers, reservoirs, sea walls, silos, etc.*

The CEMENTATION COMPANY LIMITED

BENTLEY WORKS, DONCASTER
Tel. 54177-8-9

*London office:* 39, Victoria Street, S.W.1
Tel. ABBey 5726



*150 B.H.P. Fowler 0-4-0 type diesel locomotive used by Thames Board Mills Ltd., Mersey Works, Warrington.*

- *Fowler diesel locomotives are ideal for all industrial purposes, general or specialised.*
- *Low fuel consumption and high performance for economy.*
- *Sturdy construction and simple controls for reliability.*

## Fowler diesel power in the paper industry

**Also in use in 42 other major industrial undertakings in Great Britain**

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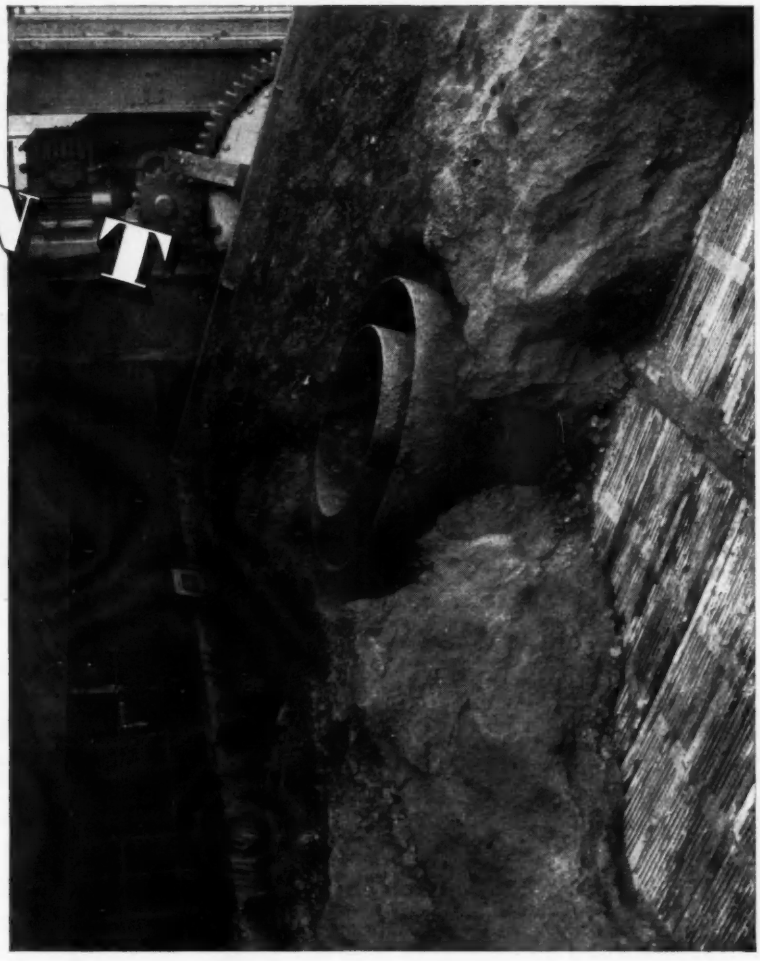
*Telephone: Leeds 30731*

FOWLER

*Products of the Marshall Organisation, Gainsborough, England.*

# A NEW SLANT ON AN OLD PROBLEM



THE COMPLETELY mechanised oxide handling plant of Tower Box Purifiers gives the perfect answer to the old problem of oxide renewal. What used to be an unpleasant laborious task involving many man-hours can now be done mechanically and speedily.

Balfour's modern method comprises removal of the trays of exhausted oxide, mechanical tippling (illustrated), replenishment with fresh oxide and replacement in the tower. Provision is also made for crushing and mixing the material.

This is but one feature of the BALFOUR-LECOCQ system. Many others have been evolved by our Design Staff, who are ready to discuss your problems.

Balfour OF LEVEN

## HENRY BALFOUR & COMPANY LTD.

**Artillery House, Artillery Row, London, S.W.1. and Durie Foundry, Leven, Fife.**

A MEMBER OF THE BALFOUR GROUP OF COMPANIES

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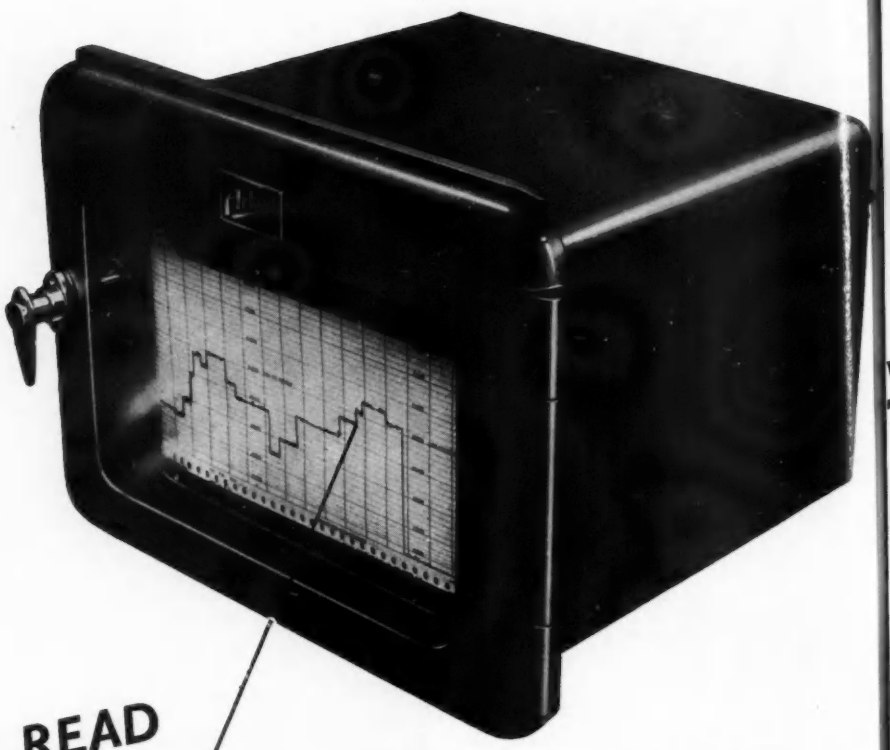

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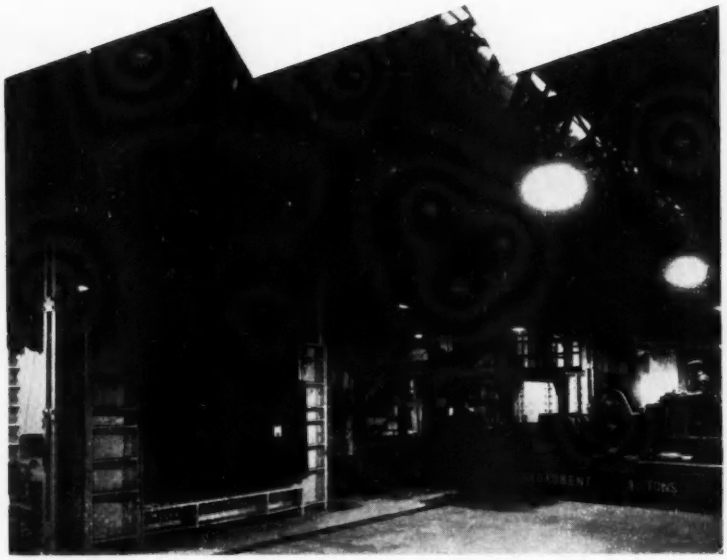

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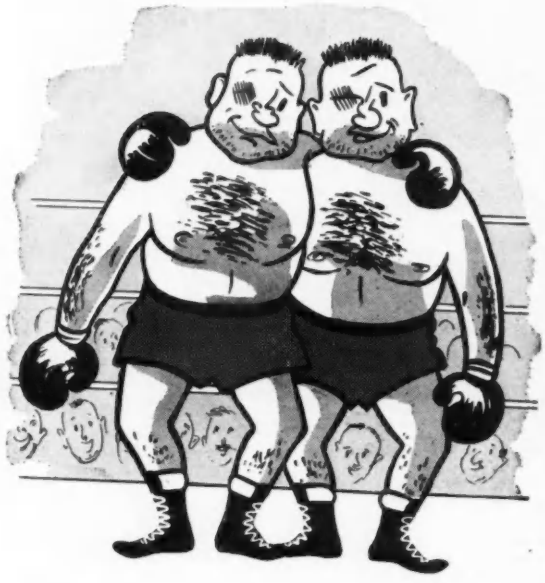

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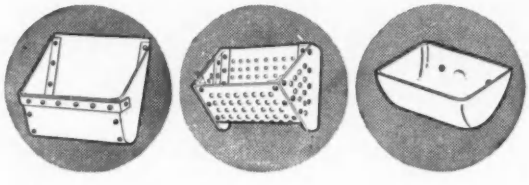

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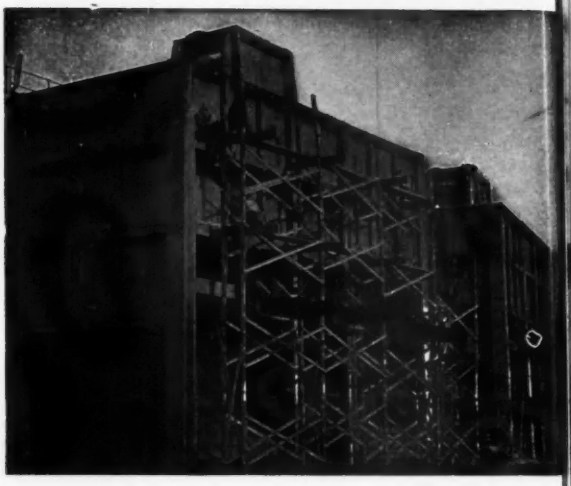

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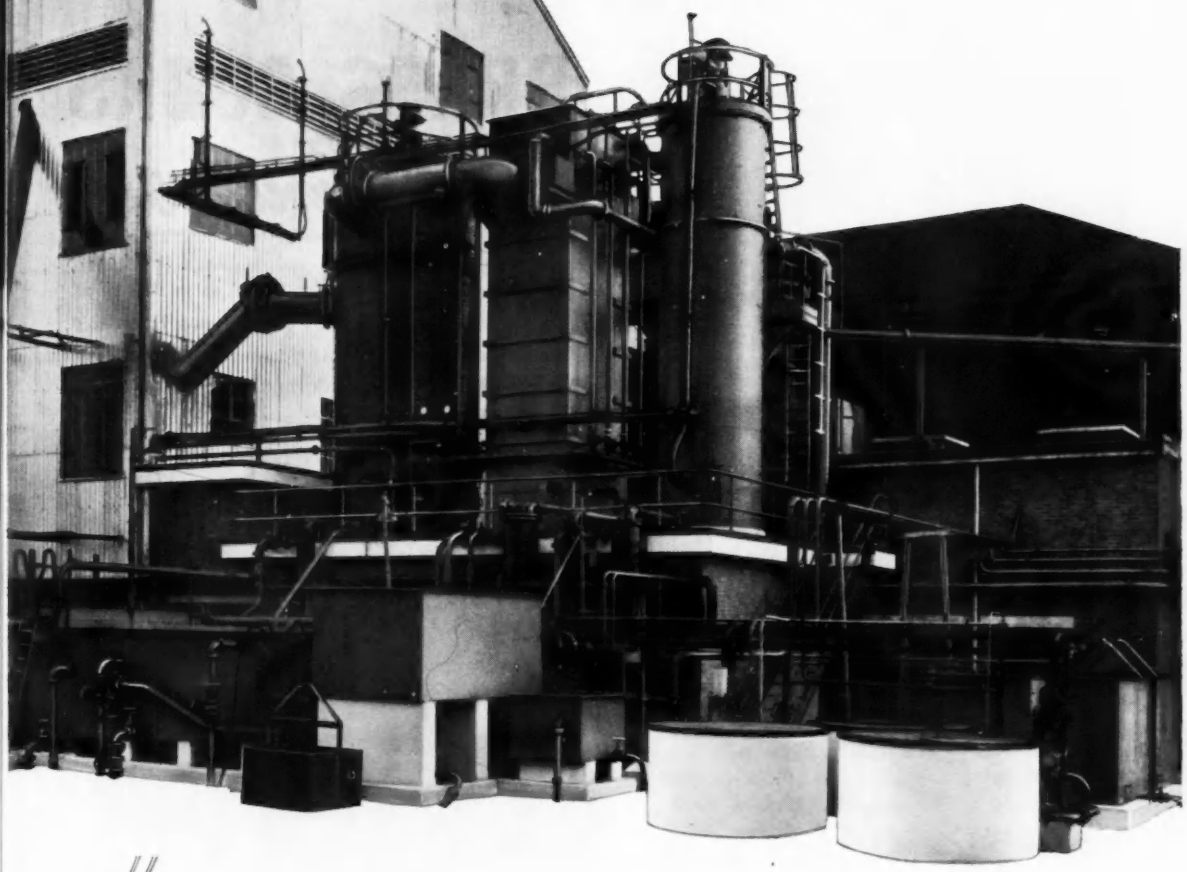

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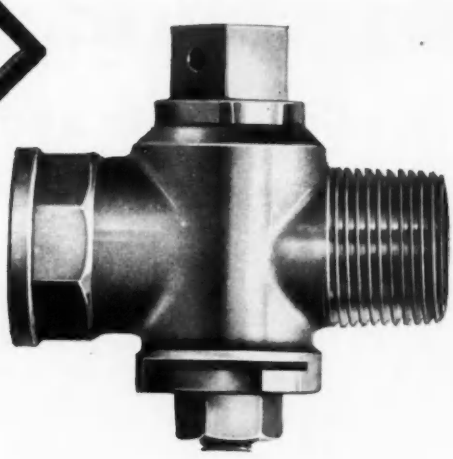

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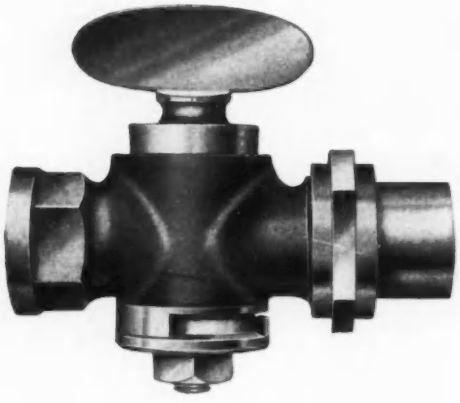

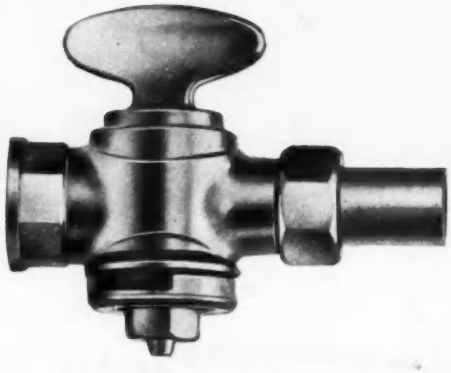

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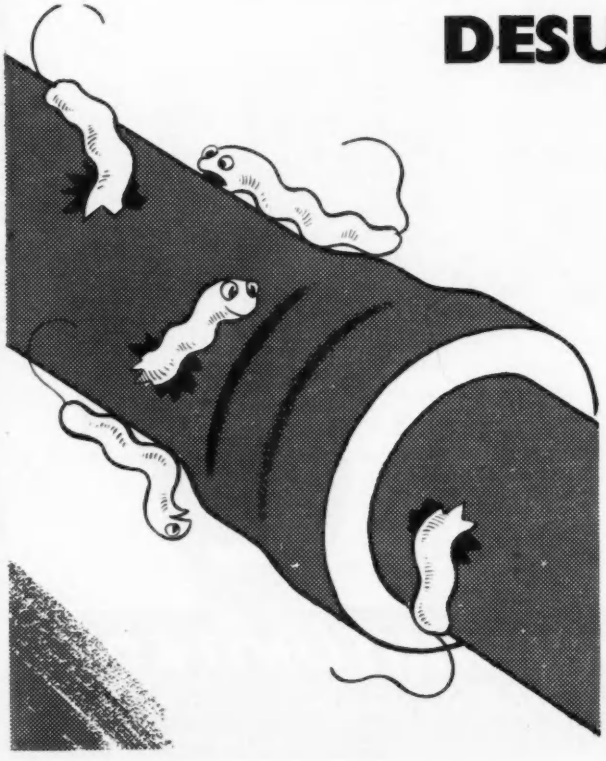

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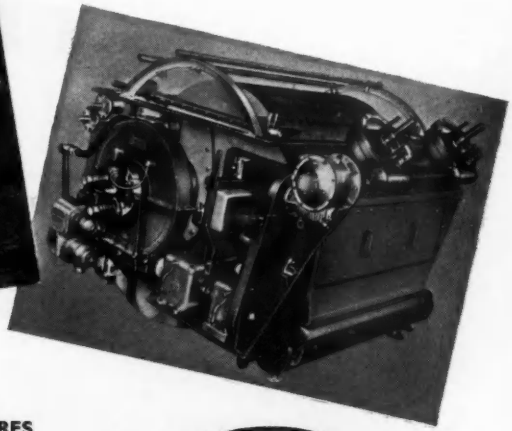

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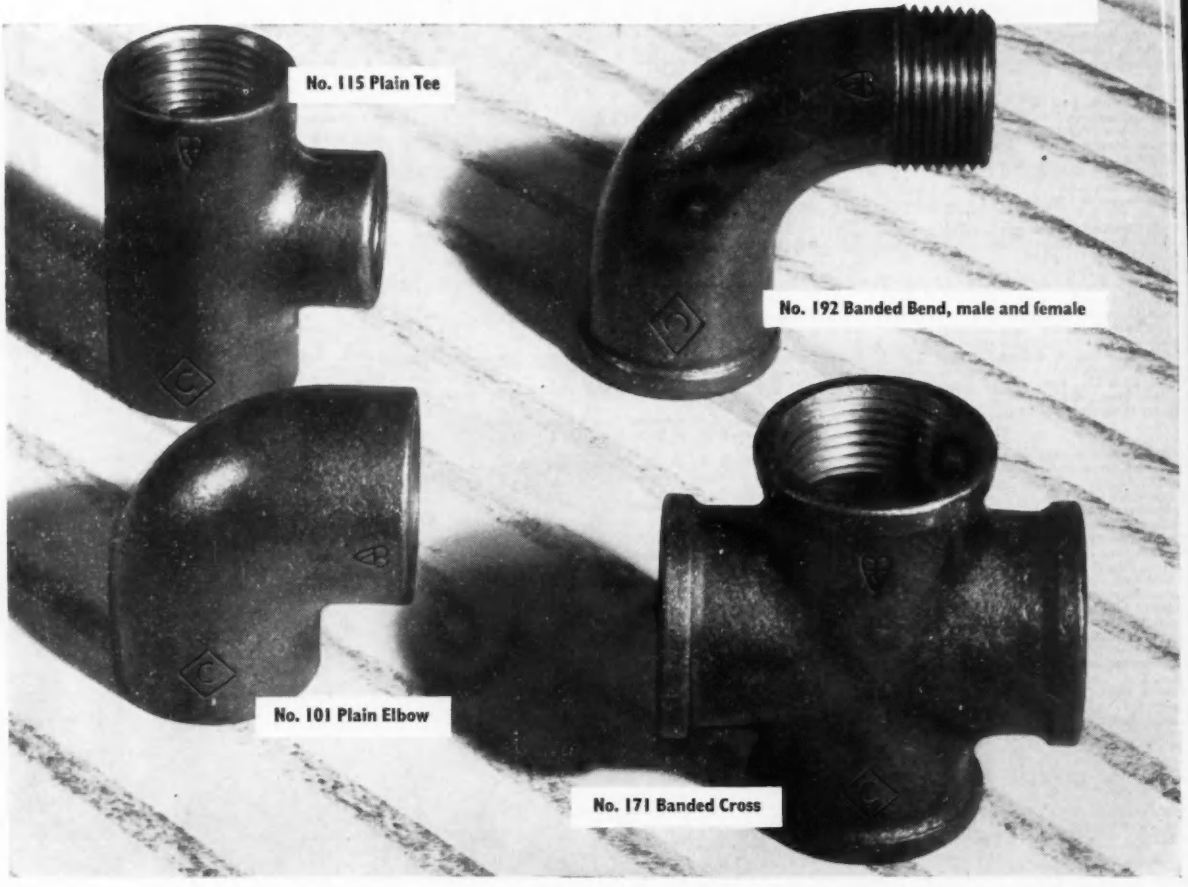


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# Gas Journal

*VOL. 286* *NO. 4850* *June 27, 1956*

108TH YEAR

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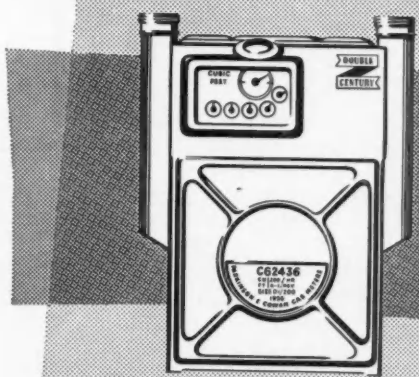


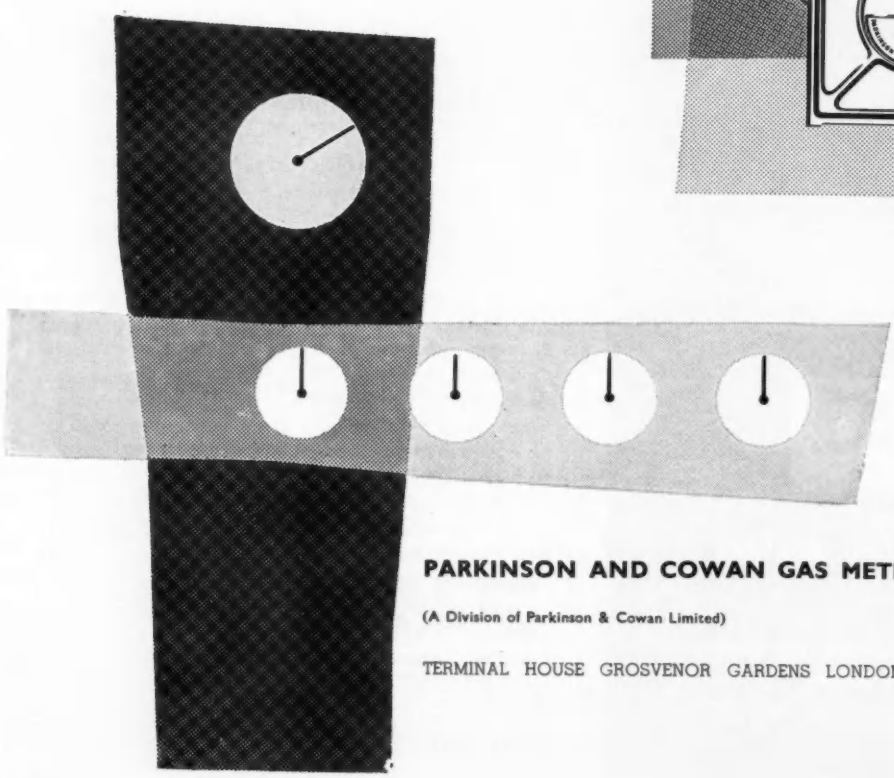

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# Gas Journal

VOLUME 286. No. 4850. JUNE 27, 1956. 108th YEAR

## *A 'Romantic Effort'*

INTEGRATION is really nothing new. Long before nationalisation the British gas industry had embarked here and there on local schemes of integration. And today, of course, integration is the rule. It is commonplace. It is no longer news.

But the integration which had been achieved in Wales, the 'Romantic Effort,' as it has been called, of not only effecting integration within the industry itself but of also carrying out its concurrent integration with another industry for the common good of both—and to the great advantage of their respective customers—is not the rule. It is not commonplace. And it is still news.

It is still news because it is still not generally appreciated throughout the country; because it has been an outstanding success; because further outstanding success lies ahead; and because it complied in advance with Government fuel utilization policy before that policy had even been framed. It is something of which the Wales Gas Board may be justly proud—and, indeed, are justly proud, as was highlighted by Mr. T. Mervyn Jones, Chairman, when he spoke to members of the Press who visited South Wales as his and the Gas Council's guests recently (see story on p. 951).

This happy partnership is, of course, between the gas industry and the steel industry—the Wales Gas Board and the Steel Company of Wales. Realizing the vast by-product of gas inevitably generated in the coke ovens of the steel industry, the Wales Gas Board decided to concentrate on collecting its gas from these outside sources for distribution to its customers, and itself to carbonize as little coal as possible.

This integration of two of the three major industries in the Principality has, of course, been of especial benefit to the third Welsh industrial giant—coal. It has ensured the right fuel being used for the right job and has wiped the word 'waste' from the Welsh industrial fuel balance sheets. And as we have already said, it has worked to the advantage of all concerned. The domestic consumer has one of the lowest gas bills in the British Isles—and that notwithstanding the recently announced increase of 2d. a therm in the price of Wales Gas Board gas. The industrial customer of the Steel Company benefits by virtue of £3 paid by the Gas Board in respect of gas produced in the £15 process of manufacturing a ton of pig iron. And to date well over a million tons of coal have been saved. Moreover, it is expected that in the near future it will be possible to process and feed 'firedamp' into the grid thus effecting further all round economies.

There are, in fact, two grid systems in the Principality: The North Wales Grid, and the South Wales Grid. Their construction is the outcome of the two-fold integration which has taken place, and their completion has been possible only as a result of the Board's pioneering use in this country of American pipeline laying techniques. The existence of these two great distribution systems means that the needs of industry can be supplied at almost any point along the North or South Wales coast. And within two years 90% of gas supplied by these grids will have come from outside sources.

It is hardly surprising, therefore, that sales of gas by the Board have increased by more than 60% since 1949. Nor is it surprising that more and more industry has been converted to the use of gas for its fuel needs, and that South Wales is attracting more and more new industries. Industry already uses some 26% of all gas sold, and there are cases of large firms going into production in isolated parts of Wales simply because gas was available in adequate quantity—a feature which the industrialist could hardly look for anywhere outside the Principality.

In the South Wales area many of the older tinplate works have found a new lease of life, and have installed new and modern plant to keep pace with the demand for tinplate. Three such works have installed steel sheet annealing furnaces which, together, consume some 300 mill. cu.ft. of gas per annum. These furnaces have replaced coal or producer gas-fired plant, so that apart from more efficient working, cleaner air and better working conditions prevail within these works.

In addition to these particular installations, other processes within the steel and tinplate works are proving that town gas is the answer to their fuel problems such as with mill furnaces, core drying stoves and mill roll heating. In the allied industry of tin printing such as the manufacture of container and bottle tops, gas is the main fuel for drying and stoving purposes.

Industry in Wales has become very diverse within the last few years, and includes aluminium sheet production, wire tinning, toy manufacture, sparking plugs, optical lenses, car steering parts, convector heaters, cycle parts, potato crisps, non-ferrous metal melting, infra-red drying, food preparation and innumerable other processes, in which considerable quantities of gas have been necessary, in some cases essential, for production.

An increasing quantity of gas is being supplied for protection in the form of special atmospheres during delicate processes, even when they are accomplished with other fuels—protection against undesirable temperature effects like oxidation—or in other cases, the gas atmosphere produces desirable changes of the product as in carburizing, nitriding, and other similar modern heating practices.

In addition to a cheap and abundant supply of gas, the Wales Gas Board provides a free specialist advisory service to industrialists for advising on industrial and commercial problems, and to assist consumers in the most economic and efficient use of fuel, thus stimulating production, lowering costs, and strengthening the position of industry in the Principality. This service, which is synonymous with that offered by the National Industrial Fuel Efficiency Service, deals purely with gas usage, and many examples can be quoted where the assistance of the Board's specialists has resulted in greater production being obtained with less fuel consumption per unit produced or in direct fuel economy.

As we have said—and feel moved to say again—their achievements are something of which the Wales Gas Board may be justly proud.

## *Independent Actions?*

DID the Prime Minister's meeting with the chairmen of nationalised industries yesterday strike any unexpected sparks? It seems very unlikely because Governmental policy appeared manifest the moment coal prices were frozen; although both that decision and the one by the Central Electricity Authority were carefully timed to avoid the stigma of political pressure. Fine, independent actions, both of them. But the game was up, as we said, when the Coal Board made their announcement. For, however unpredictable economic trends are at the moment, there seems very little risk in promising to maintain pit-head prices for a year immediately after raising prices sufficiently to cover most eventualities for 18 months. In fact, we would stake our last Premium Bond on the N.C.B. sticking to their freeze. And as for the electricity industry they could decide to ignore that last coal price increase simply by cutting back the reserve they were building up for capital investment—not a move to be made lightly but one for which present Government policy would make full allowance.

Clearly, then, State industries are to be used in a manner never envisaged by Socialists, or, for that matter, by advocates of a mixed economy: As examples to private industry to refrain from raising prices to maintain profits, thus setting a lead for wage-restraint.

How badly will the gas industry be affected now that it has been left out in the cold, raising its prices when everybody else has dug in their heels? The gas boards, on the whole, are in the unfortunate position of not being able to participate, just at the moment, in these magnanimous gestures; although the South Eastern Gas Board, through its development work, has been able to peg its prices for the rest of the year, others have already been forced to raise theirs to fulfil their statutory obligations. And capital development programmes have already been cut, perforce, by their reliance on Government loans.

In fact, the gas industry suffers twice: First, its capital expenditure being cut, necessary development will have to take place at a later date; and secondly, the widespread publicity given to electricity's absorbtion of the coal-price increase and the gas industry's failure to do so, has done harm in a competitive market. However, the possibility of cutting gas prices a little where they have already gone up, to conform with the general pattern, is politically unthinkable. If an increase in price is necessary and the fact is announced the removal of that increase is tantamount to announcing a subsidy, which immediately adds flames to the wage-claim battle. Mr. Macmillan is well aware of this, of course, and subsidies towards even the most essential development schemes will be at a minimum for some time to come.

All nationalised industries, with the exception of the Coal Board which, as usual, has ensured its own financial comfort, have been placed in a precarious position. To invent a metaphor, if Mr. Macmillan's shooting is not accurate this time then the State industries—the bait—are going to be badly mauled.

What Sir Anthony and Mr. Macmillan have in mind is a bold plan and, as a policy, it is certainly better than none at all. Results, however, must come about immediately, and they depend on many factors, not least of which is the success of Government appeals for wage restraint. Employers in the price sector of industry have clearly indicated that they are not going to accept any lead in price stabilization without some guarantees from the employees' side that the uneasy circle of word-of-honour agreements will not be broken.

It certainly does seem as if the Government is about to tell all nationalised industries to co-operate by holding down their prices, and that private industry might follow suit. As both sectors of industry will fall back upon reserves for development, this inevitably means a set-back in the industrial progress of the country. For example, where the utilization of fuel is concerned, to stand still is undoubtedly to fall back when economic development is superseding other forms of establishing a nation's right to be called 'great.'

## Leeds University Reorganization

Following a meeting of the Council of the University of Leeds on June 20, at which the new pro-Chancellor, Brigadier J. Noel Tetley, presided, it was announced that three scientific departments at the University were to be reorganized and replaced by a school to be called 'The Houldsworth School of Applied Science.' This school will be constituted of the Department of Gas Engineering and General Fuel Science with Ceramics directed by the Livesey Professor, Prof. A. L. Roberts; the Department of Chemical Engineering to be directed by the Brotherton professor, to be appointed shortly; and the Department of Metallurgy directed by the Reader in Metallurgy, Mr. N. J. Petch. The work of the three departments within the school will be co-ordinated by a special committee. For some years Sir Hubert Houldsworth was a member of the staff of the Department of Coal Gas and Fuel Industries, and he was very familiar with its activities through his work as Fuel Controller and also with the National Coal Board.

# Personal Notes

MR. R. H. NAYLOR, who for the past six years has been Deputy Distribution Engineer, Liverpool Group, North Western Gas Board, has been appointed Group Distribution Engineer. He succeeds MR. F.BELL who has been appointed Distribution Engineer with the Southern Gas Board.

*Mr. R. H. Naylor.*

Mr. Naylor is a member of the Institution of Gas Engineers. His early training was done at Halifax, Yorkshire, under the late Mr. W. B. McClusky. For three-and-a-half years he was Distribution Superintendent to the Coatbridge Gas Company, Lanarkshire, and joined the old Liverpool Gas Company in 1942.

MR. W. H. NAPPER has been appointed to the purchasing and stores department of the National Coal Board. He will assist in the development of the purchasing side of this new department and will take charge of the purchasing of mining machinery, plant and equipment. Mr. Napper who is at present Divisional Sales and Service Manager of the Kent Suburban Division of the South Eastern Gas Board will take up his duties at the headquarters of the department at Hobart House on July 2. Mr. Napper entered the service of the South Suburban Gas Company in 1919 as a junior clerk and was appointed Stores Buyer for the South Eastern Gas Board when the Company was nationalised in 1949. He became Divisional Deputy Sales and Service Manager in 1953.

DR. R. LESSING has accepted nomination on behalf of the Executive Council for election as the National Smoke Abatement Society's next President. He will succeed SIR ERNEST SMITH, whose term of office expires at the annual general meeting at Southport in October. Dr. Lessing, well known as a fuel technologist and author, and a member of the Beaver Committee on Air Pollution, has been associated with the Society and its predecessor, the London Coal Smoke Abatement Society, for over 40 years.

MR. J. A. SKIRTON, Manager of the Chippenham branch of the South Western Gas Board, has retired after 49 years' service. A native of Bath, Mr. Skirton was apprenticed to the old Bath Gas Company in 1907. Except for a short break between 1909 and 1911, he remained with them throughout, and served successively as Foreman of the fitting shop, Inspector and Chief Inspector, before going to Chippenham as Manager in 1935.

MR. A. G. LUDGATER has been appointed Sales Manager of the Potterton Division of Thomas De La Rue & Co. Ltd. He will relinquish his present post of Technical Manager of the Solid Smokeless Fuels Federation to take up his new duties on August 7.

MR. CHARLES COOPER, Joint Managing Director and head of the gas and chemical engineering division of W. C. Holmes and Co., Ltd., of Huddersfield, retires in July after 38 years' service. He will, however, retain his association with the company as technical consultant. Mr. Cooper is also a director of B.H.D. Engineers, Ltd., a holding company in which W. C. Holmes and Co., Ltd., is one of the principal members. He will be succeeded as head of the gas and chemical engineering division by MR. R. J. S. THOMPSON, who joined the technical staff of W. C. Holmes under Mr. Cooper in 1928 after having held appointments in the Bradford Corporation Gas Department and in the coke oven department of Robert Heath and Low Moor, Ltd. During the war he was loaned to the Ministry of Economic Warfare (Enemy Branch) and subsequently spent three and a half years in Germany in the Public Utilities Branch of the Control Commission. Recalled by W. C. Holmes, he became their Continental representative and resided in Paris for several years. For the past few years he has also been head of the gas department of Compania de Contadores, Barcelona, who represent W. C. Holmes and other companies in Spain.

*Mr. R. J. Thompson.*

# Obituary

MR. THOMAS C. CROSBIE, chief gas meter inspector for Paisley and district, has died of gas poisoning in his home at 9, Colinslee Drive, Paisley. It was found that a pan of soup which he had been preparing had boiled over, putting out a gas jet.

MR. WILLIAM S. CAIRNS, 73-year-old retired official of the Carluke (Lanarkshire) Gas Co., has died. He was for many years secretary of the Company, continuing in other capacities after nationalisation.

MR. JOHN MORTON, who has died at Bamburgh (Northumberland) at the age of 83, was a Director of the Sunderland Gas Company until nationalisation.

MR. WALTER REGINALD LEY, Manager of the gas showrooms at Romford, Essex, has died at his home in Romford.

# Diary

**June 29.**—INCORPORATED PLANT ENGINEERS: 'Spring Design and the Plant Engineer,' A. A. D. Brown. Imperial Hotel, Birmingham, 7.30 p.m.

**June 29.**—MANCHESTER AND DISTRICT I.G.E.: Chairman's Day, Town Hall, Pontefract. Luncheon 12.30 for 1.0 p.m., followed by visit to the Hemsworth Coke Ovens.

**July 3-6.**—BRITISH WOOD PRESERVING ASSOCIATION: Annual Convention, Cambridge.

**July 6.**—MIDLAND I.G.E.: Summer Meeting and Ladies' Day, Leicester.

**July 9-14.**—SOCIETY OF CHEMICAL INDUSTRY: 75th Annual Meeting, London.

**July 16.**—EASTERN G.C.C. 2 p.m.

**July 23.**—WEST MIDLANDS G.C.C.—Birmingham Education Department, Council House, Margaret Street, Birmingham, 3.

## W.G.F. Holds One-day Training Course

FOLLOWING recommendations by the Federation's Education Sub-Committee, a one-day training course for Women's Gas Federation chairmen and secretaries was held at the Norfolk Hotel, Birmingham, recently.

During the morning Mr. J. A. Boon spoke on correct committee procedure, including the duties of the chairman, secretary, and treasurer, and the formation of sub-committees, *ad hoc* committees, and proposals and amendments, etc.

After lunch two playlets were given. The parts of the chairman were taken respectively by Miss O. L. Humphries and Miss J. Frith. The secretary and members of the audience were taken by members of the home service advisers staff. The first play showed the incorrect method of running a committee meeting; the second depicted the correct method.

After the plays, Mr. J. C. Ingram, Secretary to the West Midlands Gas Board, gave a talk on public speaking.

## RAMS Golfing Society Annual Meeting

THE annual open meeting of the RAMS Golfing Society was held recently at the Sudbrook Park Course of the Richmond (Surrey) Golf Club.

Twenty-nine players entered the Stapleford Competition against bogey, which was won by Mr. H. Barratt (Hitchin) with 37½ points. Mr. W. Patterson (Chelmsford), also with a total of 37½ points, was second, and Mr. R. S. Falkner (Ipswich) third with 37.

Best net score was made by Mr. J. D. C. Woodall (Tunbridge Wells) with 6⅛ + 20. Mr. A. Ridley (Wandgas) returned the lowest gross score with 11⅛ + 10, and Mr. S. R. Crowl (RAMS) with 21 + 6 returned the lowest net score.

*A happy group at the Britannia bowling greens.*

# EASTERN SECTION AT GREAT YARMOUTH

THE Sixth Annual General Meeting of the Eastern Section of the Institution, held at Great Yarmouth on June 14 and 15, under the Chairmanship of Mr. J. H. Greenacre, J.P., was acclaimed by all as an exceptionally happy affair. It opened with an informal reception by Mr. and Mrs. Greenacre the previous evening, and the traditional golf and bowls competitions were held before the Annual Meeting next day. This was followed by a reception, dance, and cabaret at the Town Hall, by invitation of the Mayor, Alderman Mrs. L. M. Gilham. A further business session was held on the Friday morning, at which a paper was presented by Mr. J. T. Brookes, Distribution Engineer, and Sales Manager of the Norwich Division (to be published in full in the July 'GAS SERVICE'); and the final function was a luncheon in the Floral Hall at Gorleston.

*Left to right: W. A. Evetts, K. L. Clark, T. N. Jackson, W. D. Wilson, F. A. Rhead, F. C. Bedloe, D. Whiteley.*

*Left to right: John Corrigan, Owen Francis, R. C. and Mrs. Wardell, J. H. Dyde, Mrs. and J. H. Greenacre, Mrs. Gilham (Mayor of Great Yarmouth), A. G. Higgins.*

The Annual Meeting, which was held in the Council Chamber of the Town Hall, opened with a brief address of welcome by the Mayor. Apologies for absence were received from Sir Henry Jones, Deputy Chairman of the Gas Council, Sir John Stephenson, Chairman of the Eastern Gas Board, Mr. R. S. Johnson, Chairman of the East Midlands Gas Board, and Mr. J. S. Smith, of the Ministry. The Chairman welcomed Mr. J. H. Dyde, Deputy Chairman of the Eastern Gas Board, and Mr. John Corrigan, Chairman of the Midland Section of the Institution.

Officers for 1956-57 will be as follows:

*Chairman:* R. C. Wardell, B.SC.(ENG.), (Boston).

*Senior Vice-Chairman:* D. B. Parkinson, M.B.E., M.A. (London).

*Junior Vice-Chairman:* W. Bolton (St. Neots).

Mr. J. Hunter-Rioch, M.B.E., was re-elected Hon. Secretary and Treasurer; and Mr. F. T. Brookes and Mr. K. B. Meggitt were elected to the Management Committee. Mr. A. W. Mather and Mr. H. H. Redwood were re-elected Auditors.

Mr. Greenacre then read his address, extracts from which are published on p. 957. The vote of thanks was proposed by Mr. R. A. Weston, M.B.E. (General Manager, Norwich Division, E.G.B.), who said the Chairman had given a very clear picture of his rural group of undertakings. Mr. Bernard Clarke, M.B.E. (General Manager, Lincolnshire Division, E.M.G.B.), seconding, referred to the very big part which small undertakings played in maintaining the prestige of the industry as a whole. The public had on no occasion been let down.

Mr. Dyde asked to be allowed to endorse the well-merited congratulations on the address. As Chairman of the Special Expenditure Committee of the Board he had sometimes to be hard on the propositions which were put to them; and Mr. Greenacre, who had certainly economized, had shown that he wanted to get forward with bigger-scale integration. Unfortunately such measures must wait another couple of years, but it was hoped they would in due course add to the service of the consumer.

*Left to right: W. A. Pask, G. Hudson, S. H. Stokes, F. D. Drake, J. B. Clay, and Ben Pollard.*

In the golf tournament, played over the Great Yarmouth and Caistor course, the Turner Trophy was won by Mr. S. H. Stokes and the George Wright Cup by Mr. B. Pollard. Other prizes went to Messrs. Balsom, Dunbar, G. Hudson, Clay, Battersby, and Woodcock.

On the Britannia greens, a pairs competition was played; the Derrick Wilson and Fred Wilson cups being won by Messrs. Hughes and Bradshaw. Second prize went to Messrs. L. C. Williams and F. C. Wilson; third prize to Messrs. Rhead and Whiteley.

# *Scots Coke Will Improve, Women's Meeting is Told*

COMPLAINTS of 'filthy coke,' and two different explanations of the poor quality in Scotland, were heard by about 150 representatives of women's organizations in Dumfriesshire who attended a Dumfries conference, sponsored by the Scottish Women's Advisory Council on Solid Fuel, on 'The Coke We Burn.'

In reply to the coke complaint, Mr. J. M. Gillon, Regional Coal Officer for Scotland of the Ministry of Fuel and Power, said that the quality of coke depended on the quality of coal used and also on the cleanliness of pipes and the condition of gasworks retorts. The real problem was that demand was greater than supply. The answer to the problem was increased production.

### Only Partly True

Dr. Eric Chamberlain, of the National Coal Board, said it was only partly true that coke was poor because the quality of coal supplied to gasworks was poor. Prior to the war the gas industry in Scotland made no serious attempt to use coke for domestic purposes as was done in London and the South of England, where very special precautions were taken by the gas industry to produce good domestic coke.

It was only in the last three or four years that the Scottish gas industry had begun to prepare coke in a way that would make it suitable for the domestic consumer, but as a result of what was now being done coke would be better in the future for the domestic consumer.

# Scottish Board Explains Cooker Charges

*REPLY TO COMPLAINT BY TOWN COUNCIL*

A COMPLAINT that the Scottish Gas Board charged 10% above the cost price for gas cookers which they supplied for new housing schemes has been sent by Largs Town Council to Sir Charles MacAndrew, M.P., who has placed the matter before the Ministry of Fuel and Power.

The Gas Board's reply is that the '10% uplift' covers a proportion of overhead charges, mainly in this case concerned with free maintenance to the extent of adjustment to the appliance during use and to the fitting of spare parts. It is also stated by the Board that although the consumer is charged the cost of any spare parts required, the delivery and the actual fitting of such parts are not presently chargeable items and the 'uplift' is considered by the Board to be no more than reasonable.

### Assurance Given

The Board also state that it is quite possible that the Town Council would not be quoted the same price for cookers as the Gas Board, who purchase appliances in very large numbers. An assurance is given that the Board is not credited with any money in respect of appliances sold direct to other parties by manufacturers.

## EAST OF SCOTLAND JUNIORS

### Annual Outing

ARRANGED by the President, Mr. T. C. Macdonald, the annual outing of the East of Scotland Junior Gas Association, at Perth on June 2, was a great success.

First the Perth undertaking was inspected by a few members, then there was lunch at the Windsor Restaurant, by invitation of Mr. W. Nicol Baird, Perth Group Manager, who warmly welcomed the Juniors and their ladies.

Everybody enjoyed the delightful coach-ride through the area's exquisite rural scenery to Pitlochry, where among the things to be seen was the Hydro-Electric Board's turbine plant.

At Pitlochry, in the Fishers Hotel, the President moved a vote of thanks to Mr. Baird for his assistance and hospitality.

## THREE FIRMS MOVE TO NEW ADDRESS

Spencer Bonecourt Clarkson, Ltd., have changed their address, which is now as follows: Lynton House, 7-12, Tavistock Square, London, W.C.1. Telephone: Euston 4321.

* * *

Owing to expansion of business the head office of Crane, Ltd., has been moved to 15, Red Lion Court, Fleet Street, London, E.C.4. Telephone: Fleet Street 6511. Telegrams: Cranelon Phone London. Vehicles should approach by way of Fetter Lane, E.C.4.

* * *

Cawood Wharton & Co., Ltd., have moved to new premises at Southlands, Harrogate. Telephone: Harrogate 6868; telegrams, Ransford Harrogate.

*Members of the Midland Junior Gas Association at Buxton on Ladies' Day.*

# Midland Juniors' Ladies' Day

LADIES' Day for the Midland Junior Gas Association was held at Buxton on June 14, and 112 members and their ladies, who travelled by coach and car, were entertained to luncheon at the Palace Hotel, by the Derbyshire Silica Firebrick Company.

Mr. Frank West, Chairman of the Company, welcomed the visitors to Buxton and said how delighted he was that so many ladies had been able to attend.

The President of the Midland Junior Gas Association, Mr. S. C. Crathorn, responded and thanked the Derbyshire Silica Firebrick Co. for their welcome and hospitality.

### Visit to Works

After lunch a party of 90, including 40 ladies, proceeded to the Company's works at Friden where they were welcomed by Mr. N. A. Lloyd, General Manager. Mr. Lloyd told the visitors that the company, which was founded in 1892 to utilize the Derbyshire pocket silicas for the manufacture of refractories for the gas industry, now also served the steel, glass, non-ferrous, and other industries.

Outstanding features of the works are the complete mechanization of the handling and proportioning of the various raw materials, combined with strict laboratory control of the blending of all ingredients.

Emphasis is placed on research both in the laboratory and in the works itself, with the object of producing improved products. The manufacturing processes employed are, as a result, highly advanced and often unique in the industry.

## N.Z. to Conserve Electricity

THE New Zealand Minister of Housing, the Hon. W. Sullivan, has announced that, as part of the Government's policy to conserve the use of electricity in all possible ways, it has been decided to use gas for cooking and water heating in all new State houses sited along roads where mains exist, or can be readily extended.

## *S.G.B. TAKES STEPS TO SAFEGUARD ELDERLY PEOPLE*

**STEPS taken by the Southern Gas Board to prevent accidents to elderly people in their homes were outlined in a report to a recent Southern Gas Consultative Council meeting at Oxford. The Board stated that already 6,000 cases of aged or infirm people living alone have been listed so that special care can be taken to avoid accidents with gas appliances.**

Meter readers and collectors had been asked to note cases where old folks are living alone. At the same time contacts had been made with various official and voluntary organizations from whom the utmost co-operation had been received.

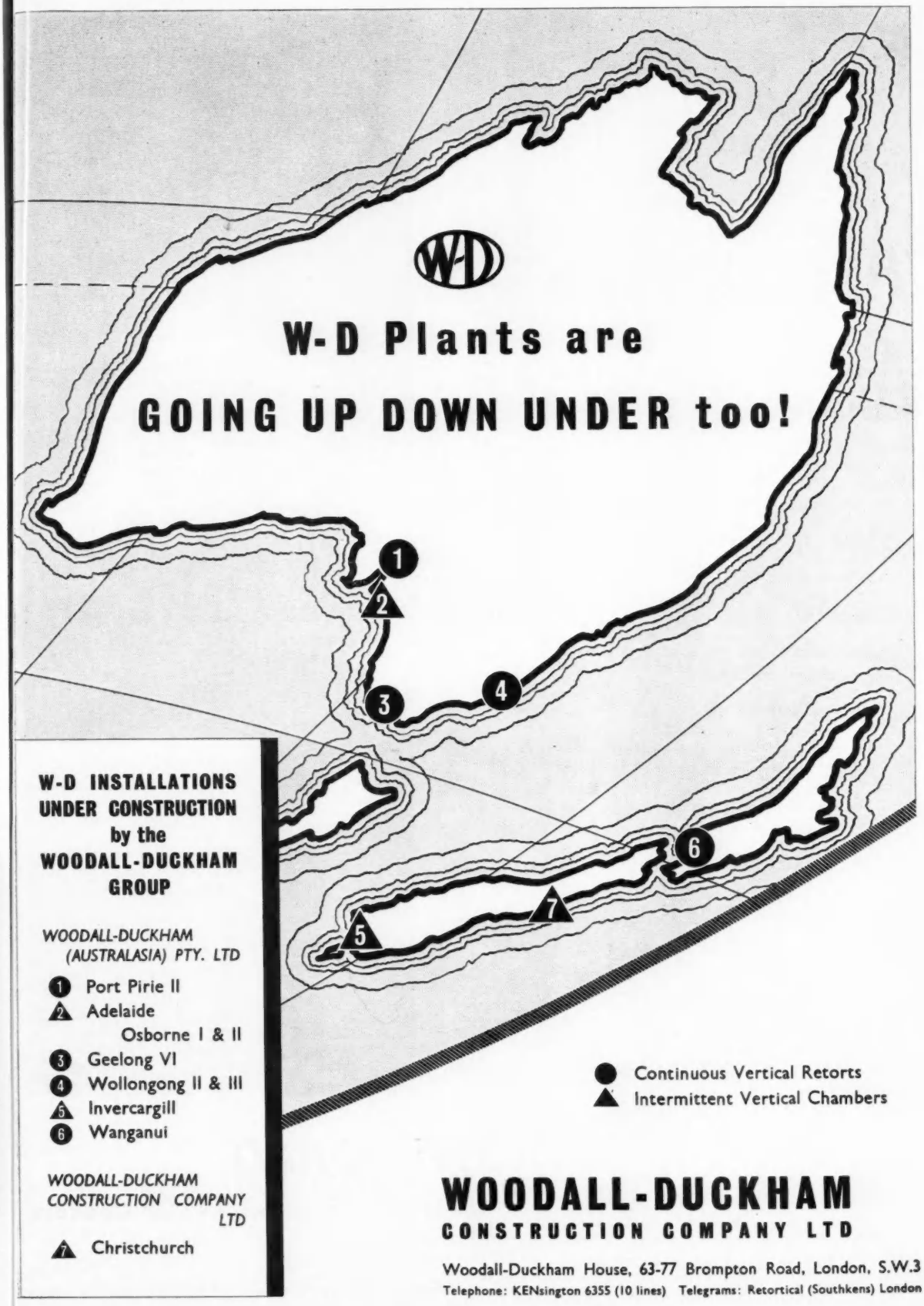
A leaflet giving guidance to the workers in these organizations had been made available, and another leaflet had been distributed to elderly people telling them how to get the best out of their gas appliances. A further step now being taken was a systematic examination of the gas installations of elderly people to try to ensure that the installations are as safe as possible.

Progress being made in various parts of the Board's area on new gasworks and other projects were outlined by the Northern and Central Divisional Committees. Regarding Didcot, it was now possible to get approximately 6½ mill. cu.ft. of gas from Reading to Didcot and Didcot to Oxford, so that the volume of gas in the city of Oxford would be adequate. In the Central Division the No. 6 gasholder was promised for completion by the contractor in June, 1957, and this would ensure the Board being in a still better position for sending on gas between Reading and Oxford.

The Board had finished the integration mains throughout the Central Division, and in both divisions the laying of mains to housing schemes was up to date.

The Council were told that on a particular day the output of gas from Reading works had been 17¼ mill. cu.ft. —the highest ever—and that there had been no reduction of pressure anywhere.

*Mr. H. R. Hems, who recently retired from his position of Industrial Gas Officer to the West Midlands Gas Board, was honoured at the May meeting of the Industrial Gas Development Committee with the presentation of a 'Tompion Clock.' Mr. H. P. Lupton (seen making the presentation) said Mr. Hems had earned the respect of all members of the Committee and of industrial engineers throughout the country.*

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C

And Now

# A Standing Arrangement

*Housewives everywhere will greet the appearance of the* **NEW WORLD** *Seventy One T.T.*

*BECAUSE*

- **It has oven and hot-plate side by side at table top height**
- **It eliminates the necessity for stooping**
- **The oven can be placed either side of the hot-plate to suit layout of kitchen**
- **Cleaning is easy—it has a vitreous-enamelled stand**
- **It is very moderately priced**

The Seventy One T.T. has been produced in response to an insistent demand for a Table Top Cooker. It has many of the features of the **NEW WORLD** Seventy Five plus the storage rack for pots and pans underneath.

**NEW WORLD**

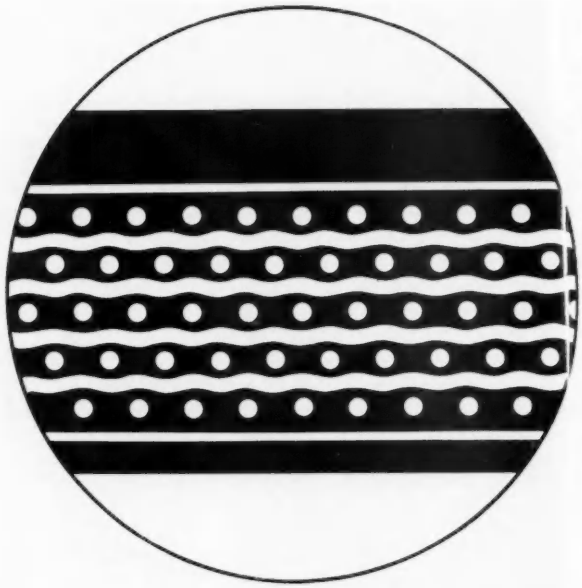
***The most famous name in Gas Cookers***

RADIATION GROUP SALES LTD., 7 STRATFORD PLACE, LONDON, W.1. TEL: MAYFAIR 6462

It's another NEW WORLD winner

PRODUCT OF Radiation Ltd.

# Focus on conveyor belting proves Goodyear superiority



There is obviously only one way of proving to yourself beyond any doubt that Goodyear conveyor belting gives long and reliable service. That's by installing it.

But for proof in advance there's the record of efficiency of Goodyear conveyor belts in thousands of existing installations in this country — in steelworks, power stations, mines, quarries, factories and foundries.

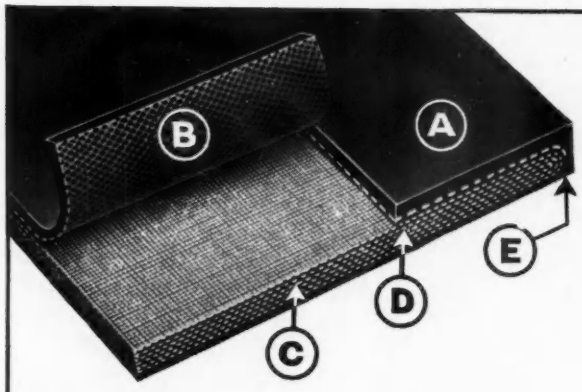
At a big steelworks, for instance, Goodyear belts conveying hot sinter are lasting over twice as long as other makes previously used.

## QUICK PROOF

Focus on conveyor belting proves Goodyear superiority, and quickly confirms that Goodyear belting makes every conveying job an economic proposition.

The emphasis is on *every*. Whatever the conveying work, there's a "job-designed" Goodyear belt to do it at the lowest cost per ton.

This cost-saving is ensured by the exceptionally high quality built into every Goodyear belt. And this quality is ensured by rigid adherence to raw material specifications and stage by stage production inspection.




**RUGGED CONSTRUCTION OF GOODYEAR BELTING**

**A** Tough, heavy-duty cover compounded to suit job.

**B** Breaker fabric to improve bond between cover and carcass — when required.

**C** Plies of close-woven duck, inhibited against mildew.

**D** Skim coat between plies prevents separation.

**E** Rugged edge cover resists wear.

## QUICK DELIVERY

You can now get quick delivery of Goodyear conveyor belts, which are available with cotton or rayon carcass in any width up to 72 inches. They can be supplied in a few weeks against specific ordering.

**GOODYEAR INDUSTRIAL RUBBER PRODUCTS**

**CONVEYOR BELTING · TRANSMISSION BELTING · V-BELTS · INDUSTRIAL HOSE**

# Coventry to have new £190,000 Purifiers

## INSTALLATION TO BE COMPLETED IN 2½ YEARS

AT a cost of £190,000 the West Midlands Gas Board has instructed Henry Balfour & Co. Ltd. to install a set of tower box purifiers at the Foleshill gas works, Coventry. The plant is due for completion within two and a half years.

The installation will purify 8,000,000 cu.ft. of town gas per day, with provision for dealing with 10,000,000 cu.ft. if required. The layout is planned so that extension can be arranged to double this capacity.

The usual features of the tower box design are incorporated, the rectangular towers being of integral construction with the purifying material contained in removable trays. In this case a new design for the shell is being used.

### Weight Reduced

Plates of troughed section allow the usual stiffening members to be dispensed with. The tower sides are of single and the divisions of double section. This new development reduces the overall weight of steel required and gives a surface more easily drained and painted.

By-pass gas connections allow the rotation of towers to be continued while any tower is shut off from the flow of gas, and also permit an additional tower to be worked, so increasing the effective capacity of the plant.

The standard type of tray tippler and oxide handling plant is incorporated, together with conveying plant for bringing in new material and for disposing of spent material.

## Gas Board Official Fêted by 300

MR. William Macnaughton, who recently retired as Chief Engineer and General Manager, Wolverhampton District, West Midlands Gas Board, was entertained to dinner, accompanied by his wife, by 300 staff and other employees at the Wulfran Hall, recently.

Among those present were Mr. G. le B. Diamond, C.B.E., Chairman of the Board, and Mr. W. R. Branson, Deputy Chairman.

The couple received a cheque, the Divisional executive staff also presenting a gold wristlet watch and hand-bag. The Divisional Sales and Service committee, of which Mr. Macnaughton was Chairman, presented a picnic set, and the Women's Gas Federation a painting.

*Northern Gas Board stand at the Tees-side Productivity Committee's recent Better Days Exhibition.*

# Wales Gas Prices to Rise

A PROPOSAL by the Wales Gas Board to increase the price of gas by an average of 2d. per therm was the main consideration of the Swansea meeting of the Wales Gas Consultative Council on June 15.

Presenting the proposal to the Council, Mr. R. S. Snelling, Deputy Chairman of the Wales Gas Board, said the Board very much regretted the step it had to take. Since the date of the last gas price advance the Board had incurred increased costs totalling £698,500 a year including the latest rise in the price of coal which would cost £190,500 a year.

The Board has not increased the price of gas in respect of the 1955 coal price increase which had cost £264,000 a year; the result was that this sum had had to be found by way of increased efficiency and economies. The proposed increase of 2d. per therm, with differential increases to the usual special category of consumers and small adjustments in tariffs the Board was prepared to make in neighbouring undertakings, was expected to produce extra revenue of £464,000 a year, thus leaving additional annual costs of £234,500 in a full year which the Board was prepared to meet by continuing increased efficiency and economies.

### Extra 4d. a Week

To the average domestic consumer the increase would mean an extra 4d. per week on the gas bill but consumers on the optional two part tariff would pay less. The rate of increase to industrialists would be in accordance with the agreements under which they bought gas. The adjustment of tariffs he had referred to meant that the first 30 therms would carry the extra 2d. and the next step something less. The net result was an average increase of three halfpence throughout the Board's area.

During the ensuing discussion some members thought it would have been better for the Board to have increased the price so as to cover all the increased costs. Councillor G. Adams disagreed with this. Mr. T. Gale said he took the view that the Board had got to face up to realities; it seemed to him that to increase the price of gas and still leave a large deficiency, was to live in a fool's paradise.

### Proposals Approved

On the proposal of Councillor Adams, seconded by Councillor Mrs. M. Howse the Council unanimously approved the Board's proposals.

Mr. Gale questioned the Gas Board's decision to take temporary measures to maintain the gas manufacturing plant at Llanrwst and Crickhowell which had been given priority for grid supply.

Mr. Snelling said that thousands of pounds in capital expenditure had been saved by temporarily dropping Crickhowell from inclusion in the grid system. The Board would be re-examining its capital expenditure programme in the autumn, however, and even if the credit squeeze was still on it did not necessarily mean that Crickhowell would be overlooked.

D

# New Move to Prevent Erection of Riverside Holder

IN a new move to prevent the North Thames Gas Board erecting a 90 ft. gas holder at Mill Lane, Taplow, the Berkshire County Planning Committee have suggested that two small holders would be better than one giant one.

The Committee object that the large holder would be an 'undesirable intrusion into the landscape adjoining the River Thames.' They recall that the Maidenhead Town Council had approached the Minister of Housing and Local Government who had refused to intervene. He had pointed out that the North Thames Gas Board had a right to build a gasholder on the land and there was little he or the local authority could do about it.

### Height to be Reduced

The holder as planned will be 96 ft. high and 144 ft. in diameter, but it is proposed to reduce the height above ground level to 90 ft. by sinking the bottom tank 6 ft. into the ground. It is required to provide additional storage facilities and is to be built on land owned by the Board to the east of Mill Lane, Taplow.

The Gas Board has complied with opposition to some extent by reducing the height of the gasholder from 120 ft. as originally proposed. But any further reduction in height, they say would result in considerable expense which they cannot afford.

## *MAN IS FINED £5 FOR GAS THEFT*

A FINE of £5 and £3 18s. costs were imposed by Bradford City Court recently on Dennis Walter Bland, 35, radiator repairer, of Leamington Street, Bradford, for fraudulently abstracting 145,200 cu.ft. of gas belonging to the North Eastern Gas Board.

It was stated that because of arrears Bland's gas was cut off in November, 1954. He managed to link up his supply again and abstracted £59 worth of gas before he was found out in May this year.

Bland, who has a wife and four children, said his family was ill and he had no money at the time of the offence, but he intended to make good the loss to the Gas Board.

**Plans** for £100,000 extensions to their Durig foundry are announced by Henry Balfour & Co., Ltd., Leven, Fife. The improvements will include locker and other facilities for 100 moulding shop workers as well as other welfare facilities.

*Mr. W. D. Wilson, Chairman, George Wilson Gas Meters, Ltd., Coventry, receives the table tennis cup at a recent dance organized by the company's social committee.*

# W.G.B. Chairman Inspects Power House at Show

MR. MERVYN JONES, Chairman of the Wales Gas Board, visited the power house at the Bath and West Agricultural Show held recently at Cardiff. He was shown round the building by Sir Percy Lister, Chairman of R. A. Lister and Co. Ltd., the Gloucestershire engineering firm responsible for the installation of the plant which provided electric light and power throughout the 100 acre showgrounds.

### Of Much Interest

Included in the plant was a Lister-Blackstone 8-cylinder turbo-charged diesel engine which was of much interest to Mr. Mervyn Jones since a similar 600 h.p. unit has been selected to drive the compressor set at the new Llanelly works of the Wales Gas Board.

Mr. Mervyn Jones also examined the waste heat recovery unit incorporated in this engine. By means of this unit it was possible to provide—without any additional expense—a continuous supply of hot water for herdsmen, caterers, and other users throughout the show. It is possible that similar equipment will be included in the plant at Llanelly to provide an economical hot water supply to laboratories and offices on the site.

The installation work at Llanelly will be carried out by the main contractors, Bryan Donkin Ltd., in conjunction with the engine manufacturers.

**Watched** by a crowd of 250,000, a decorated lorry, featuring catering equipment manufactured by Stotts of Oldham, won a first prize—the Clayton Challenge Trophy—in the Oldham Carnival lorries and floats display, recently.

## *German Gas Associations Hold Annual Meeting in Berlin*

THE annual general meeting of the two associations, the German Association of Gas and Water Engineers (DVGW) and the German Gas and Waterworks' Association was held this year in Berlin during May. The Institution of Gas Engineers was represented at this Meeting by Mr W. K. Hutchison, C.B.E., and Dr. W. T. K. Braunholtz, O.B.E., and representatives of seven other countries also attended.

A full account of the meeting and the speeches and papers given are published in *Gas- und Wasserfach*. The technical gas papers included 'Safeguarding Gas Production,' by Dr. M. Raschig, 'Present Development of Gas Distribution,' by H. Sachwe, 'Modern House Installations,' by B. Growe, and 'State of Development of Gas Appliances,' by Dr. G. Heidtkamp.

### Outstanding Visit

Among a variety of works visits, the outstanding one was to the new gasworks at Mariendorf. The building of this plant, which will ultimately comprise four batteries of 22 coke ovens each, was started in May, 1952, and the first battery commenced operation in July, 1953. The eventual capacity will be about 50 mill. cu.ft. per day. At the moment the final plant is about 50% completed.

In addition to coke ovens, peak load gas is provided by a catalytic oil gas plant using brown coal low-temperature tar and by liquefied petroleum gas. The undertaking was formerly owned by the Imperial Continental Gas Association and the previous works were built in 1901-02 by Edward Drory (1844-1904), its Chief Engineer, a memorial stone to whom stands in a most attractive setting on the works.

## *COKE OVEN EXTENSIONS IN DURHAM*

THE Durham Coal Board's £2 mill. extension scheme at Monkton Coke Works, near Jarrow, is expected to be completed before next winter.

The number of coke-ovens is being doubled to 66, while the amount of gas produced is to be increased from 4 mill. cu.ft. a day to about 9 mill. cu.ft. The project is part of a £21 mill. carbonization development programme drawn up by the Durham Coal Board.

Coke ovens of Sadler & Co. at Bishop Auckland, Co. Durham, are also to be extended by a further battery of 11. The existing battery comprises 15 ovens.

## IN THE LAND OF TWO-FOLD INTEGRATION

*A masterpiece of modern industrial architecture—the Pontypool plant of British Nylon Spinners, Ltd.*

# Three Big Users of Gas in Wales

## GAS COUNCIL SPONSORS VISIT TO SOME OF W. G. B.'S BEST CUSTOMERS

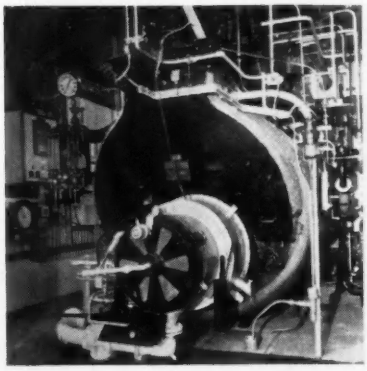
WHEN you plunge a tin-opener into a can, rip it open, pour out the contents, and pitch the wreckage into the dustbin, do you ever pause to wonder how it was made?

Probably not. Probably you feel it would not be of much interest—any way as far as the gas industry is concerned. But there you would be wrong. . . .

Take the Metal Box Co.'s factory at Neath, for example—and you have probably opened thousands of containers made by this company in your time. As the members of a party of representatives of the Press who visited South Wales under the auspices of the Gas Council recently learned, this factory is one of the Wales Gas Board's largest customers, burning some 180 mill. cu.ft. of gas a year.

The factory, which makes components from locally supplied tinplate for assembly at other of the Metal Box Co.'s factories in the U.K., has three main production departments, printing and lacquering, general line container, and open top food can. All three departments use gas.

By far the biggest consumption, however, is in the printing and lacquering section with its 11 lacquering and seven printing lines. The huge, tunnel-like drying ovens through which sheets of tinplate pass after being lacquered, and again after being printed, are responsible for 80% of the factory's consumption. The ovens take several thousand sheets of tinplate an hour, and dry them at temperatures between 250°F. and 395°F. Later, these sheets are used to make the ends and bodies of cans.



*Metal Box Co.'s gas-fired summer boiler.*

More than one mill. cu.ft. of gas is used each month in the open top department, where 30 presses punch the tops and bottoms of processed food cans out of sheets of tinplate. The can ends are then curled, and a lining compound is sprayed into the inside of the rim. The compound, which gives a hermetic seal to the assembled can, has to be dried. This is done in gas-heated ovens.

The third section at Neath, the general line container department, produces a variety of lids, ends, can bodies, and the Garda cap, a vacuum lid for jars used to contain preserves, etc. It consumes 1.5 mill. cu.ft. of gas a month. Here also, the gas is used for the drying of lining compounds.

The components made at Neath are sent to more than 30 other factories of the Metal Box Co. up and down the country—factories which specialize in the production of the food can; the manufacture of tobacco, cigarettes and cosmetic tins; tins for polishes, paints, and varnishes; and boxes for cakes and sweetmeats.

Thousands of millions of components are made at this factory over the year—right now some 70 mill. food can ends are being turned out each week, and the

# The stars of today . . .

Brigitte Bardot, delightful French star, made her British screen debut opposite Dirk Bogarde in the VistaVision-Technicolor comedy "Doctor At Sea". Adapted from the best-selling novel by Richard Gordon, "Doctor At Sea" is a J. Arthur Rank Organisation release, produced by Betty Box and directed by Ralph Thomas.

. . . are created by public acclaim. Cinema audiences acclaim charming Brigitte Bardot, who starred in the film "Doctor At Sea"—and housewives acclaim the Century Cooker, which features in thousands of modern kitchens throughout the British Isles.

The roles of these two stars in contemporary life are in widely differing fields, but the pre-eminence of both is the result of their fulfilling the exacting demands of their respective roles.

## Star features of the CENTURY

- ★ Vitreous enamelled surfaces throughout
- ★ Cream exterior
- ★ Removable double platerack
- ★ Used oven heat vented in front of backplate to heat platerack
- ★ Four fast-boiling hotplate burners with fixed stop for simmering
- ★ Large quick-heating grill
- ★ Safety-type taps
- ★ Hotplate parts removable
- ★ Roomy oven—base suitable for slow cooking
- ★ Mainstat controls oven temperature
- ★ Drop-type oven door
- ★ Oven lights from front by flash tube
- ★ Storage space in plinth
- ★ Hotplate side extensions and gas lighter supplied if required

**R. & A. MAIN LIMITED**
**LONDON and**
**FALKIRK**

C 59

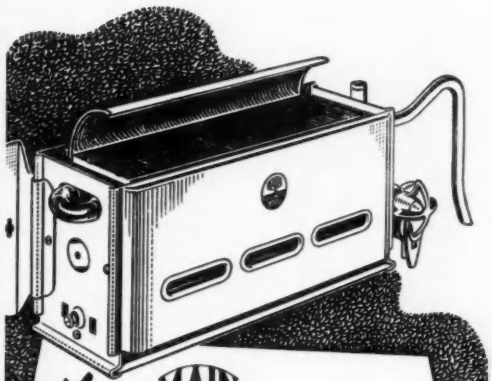
The MAIN No. 20

# CENTURY COOKER

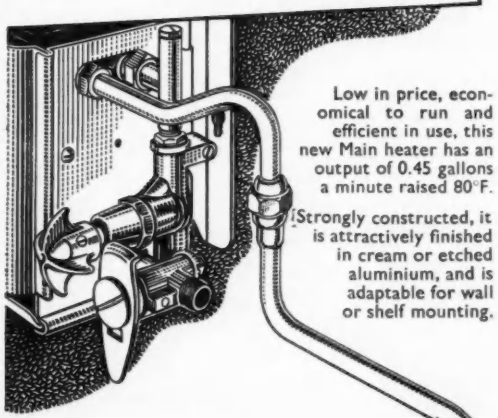
Note the name-made by MAIN

C 59

the *NEW* water heater for single-point duty . . .



*the* MAIN **MINIMAIN** *instantaneous* GAS WATER HEATER



Low in price, economical to run and efficient in use, this new Main heater has an output of 0.45 gallons a minute raised 80°F.

Strongly constructed, it is attractively finished in cream or etched aluminium, and is adaptable for wall or shelf mounting.

**ACCESSORIES AVAILABLE**

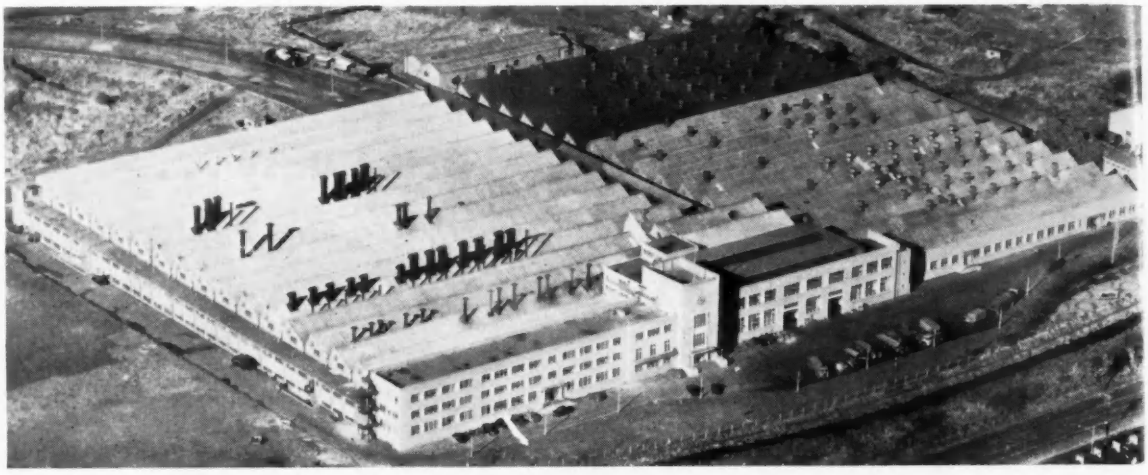
Products deflector ● Swivel outlet spout ● Gas Governor ● Interlocking Gas and Water Cocks complete with gas and water throttles and pilot light

*low priced to meet popular demand*

**MAIN WATER HEATERS LTD.**

Gothic Works, Thornton Road, Croydon, Surrey

W 34



*Aerial view of the Neath factory of the Metal Box Co., Ltd.*

seasonal peak demand has long since been passed. It is really rather remarkable when you come to weigh it up.

A further rather remarkable thing about this generally remarkable factory is the steam-raising set-up. In winter, requirements are raised with the use of coal fired burners. But in summer, subsidiary gas heating comes into operation, consuming some 9,000 cu.ft. an hour.

This, of course, is an excellent arrangement from the point of view of the company. And a perfect arrangement from the point of view of the Neath gas undertaking and the Wales Gas Board.

At the conclusion of the visit to the Metal Box Co., the party continued to Porthcawl where they were entertained to dinner and spent the night as guests of the Wales Gas Board. Mr. T. Mervyn Jones, Chairman of the Board, presided, and was supported by his Deputy Chairman, Mr. R. S. Snelling, as well as Mr. J. C. Clay, Mr. F. E. Price, and Councillor E. Emmanuel, members of his Board.

After dinner Mr. Mervyn Jones spoke on the rôle of gas in the industrial life of the Principality with special emphasis on the two-fold integration which had taken place—integration within the gas industry itself and its further integration with the steel industry. This is the subject of comment in our editorial columns this week.

On the following day, the party visited the plant of Hoover (Washing Machines) Ltd., Merthyr Tydfil, which consumes about 130 mill. cu.ft. of gas a year.

Some 15 different aluminium silicon alloy washing machine components are cast in the die-cast foundry, ranging in weight from 4 lb. to 6 oz. and including such diverse parts as wringer castings, mounting brackets, and pulley wheels.

The alloy, in ingots, arrives in pallets and is fed into a Monometer rotary furnace of one ton capacity—a monster to inspire awe in the visitor—where it is brought to a temperature of 800°C. The furnace, which runs continuously except for week-ends, is heated by gas consumed at a maximum rate of 4,000 cu.ft. an hour; normally about 2,700 cu.ft. an hour are used.

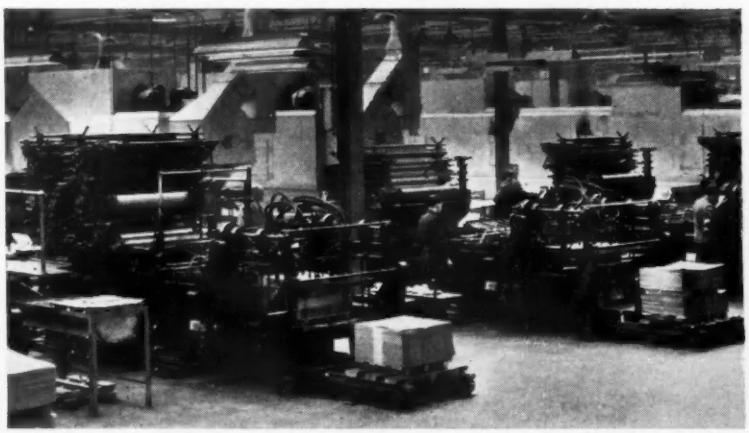
For each of the ten die-casting machines used there is a gas heated A.G.M. reverberatory holding furnace to which molten metal is supplied from a 250-lb. crucible running on a monorail from the Monometer furnace.

There are two types of A.G.M. furnace —200 lb. and 500 lb. capacity, consuming 500 to 1,000 cu.ft. of gas an hour according to the needs of the particular die-casting machine.

There are three enamelling plants using gas, two of them made by The Carrier Engineering Co. Ltd.; the other by Heat and Air Systems Ltd.

Although they vary in size and capacity, the principle of operation is the same in each. Components which have been spray painted are carried by conveyor into gas heated stoving ovens, different ovens being used for the primer and finishing coat enamel.

The primer is stoved at 380°F. for 20 minutes and the finished coat enamel at 280°F. for 16 minutes, oven temperatures being controlled by thermostats actuating diaphragm type gas valves.



*Part of the Metal Box Company's lacquering section which has a very heavy gas consumption.*

### Protective Devices

Automatic protective devices guard against flame failure and excessive duct temperature and if necessary would cut off the gas and electricity supplies to guard against fire and explosion. There is a similar control for the automatically actuated $CO_2$ anti-fire equipment.

The three stoving ovens together consume approximately 7,000 cu.ft. of gas per hour.

An important component of the Hoover washing machine is the steel torsion bar used in the power wringer. In the manufacture of this, various heat treatments are employed, using a series of 18 in. × 24 in. I.C.I. furnaces and ancillary equipment. The furnaces are gas heated and electrically controlled, each using approximately 450 cu.ft. of gas per hour.

Before machining, the torsion bars are isothermally annealed at a temperature of 690°C. for an hour, and are then raised by an overhead gantry and quenched in a gas heated hot water tank.

They are then machined and returned to a furnace, where they are held at

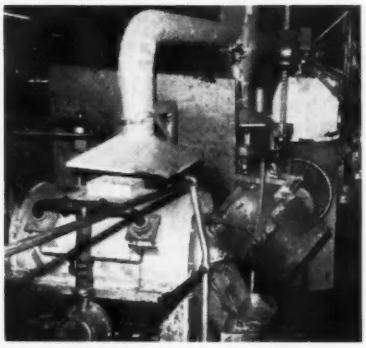
850°C. for 15 minutes, before being quenched in oil, washed in gas heated hot water, and dried in a gas oven.

They then go into a tempering furnace to obtain the desired mechanical properties in the metal. Here they are heated for 30 minutes at a temperature of 450°C. They are then quenched and washed in hot water.

The tool room hardening shop contains an I.C.I. cyanide furnace and preheater, a neutral salt furnace and preheater, a tempering bath, a Lucas muffle furnace, and four Incandescent heat treatment furnaces.

In the varying processes, heat is applied at temperatures from 250°C. to 1,000°C. for periods of from one to 120 hours. The furnaces each use from 500 to 1,000 cu.ft. of gas per hour.

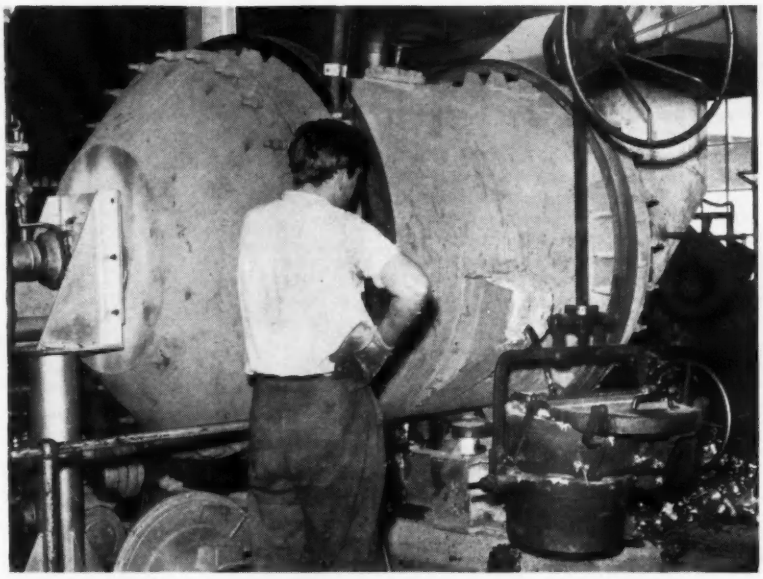
Other gas-using processes in the Hoover factory include the Bonderizing plant, where metal is phosphated by dipping before painting, the components being dried in a gas heated oven at 200°F.; the etching, prior to anodizing,



*Refilling A.G.M. reverberatory furnace with portable crucible.*

of aluminium components by immersion in gas heated sulphuric acid; the stripping of anodic films from rejects from the anodizing process; and the removing of paint from steel components in gas heated caustic soda.

Answering questions after the tour of the factory, the General Manager, Mr. W. J. Dimmock, said that output was



*Monometer remelt furnace. Tipping to fill portable crucible.*

now 7,000 machines a week against 12,000 a week a year ago. Factory stocks were piling up.

Of last year's higher output 51% had found its way into overseas markets. This year's export share of the business was 56%, though the decline in number had been compensated financially by an increase in quality. On the other hand, export markets must be lost in the long run as the importing countries started, themselves, to manufacture—unless revolutionary improvements could be incorporated in the product for export.

### Outlook Bright

Mr. Dimmock, however, did not view the outlook with misgiving. Retail sales were on the upward trend again and nearly back to 1955 levels. The market had reached only about 25% saturation against 70% in the case of vacuum cleaners—which continued to be sold.

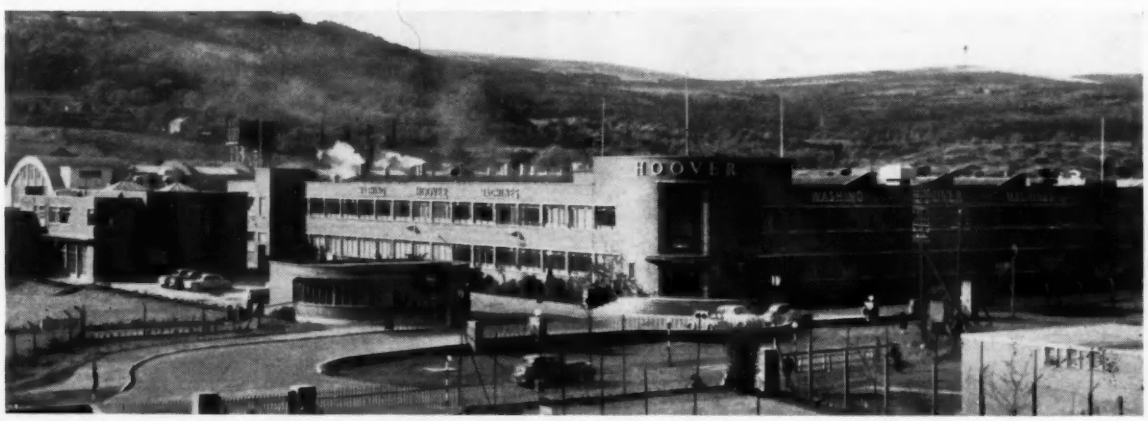
Production planning had continued unaffected despite the 5,000-a-week dip in output: New equipment was constantly being installed, including, a few weeks ago, £30,000 electrostatic paint spraying gear.

And the visitor's impression of it all? Machine tools going at full blast and the three-and-a-half miles of overhead conveyor crammed full of components moving silently and ceaselessly between the various processing departments.

In the afternoon the party made its final visit, to British Nylon Spinners, Ltd., Pontypool.

Nylon may, of course, be numbered among the by-products of the gas industry, since the benzene which is one of its constituents is derived from the coal-tar produced when coal is coked to provide coal gas.

As fuel, approximately 250 mill. cu.ft. of gas per annum is consumed each year at the B.N.S. plant at Pontypool. The main use is for the Dowtherm system which serves the highly specialized yarn extrusion process. Nylon yarn is produced by extrusion in the molten state from a large number of small units. The temperature of operation is in the region




*The Hoover (Washing Machines), Ltd., factory at Merthyr Tydfil.*

of 300°C., and needs very accurate control. To ensure this accuracy, a condensing vapour is used as the heating medium. Provided that its pressure is kept constant, the condensing vapour releases its latent heat at a constant temperature.

To have used steam at the temperature required would have called for very high pressures, complicating the design of the extrusion units. The medium chosen —Dowtherm—is the eutectic mixture of diphenyl and diphenyl oxide, which boils at a temperature of approximately 257°C.

A centralized vapourizing system for the Dowtherm was chosen in preference to a number of individual units to simplify and centralize control and operation. Gas was chosen for the fuel as striking the best combination between price, reliability, cleanliness, and ease of control.

The extrusion plant is divided into two parts for heating purposes, each being fed by one vapourizer having a maximum rated output of 11 mill. B.Th.U. per hour. The process is continuous, shutdown being allowed for one week only in the year. A third such vapourizer can be connected into either part of the system at will, to allow maintenance work to be done, if necessary, at other times.

### Valve Control

The vaporizers are of the liquid tube type with natural convection circulation. Each is fired by two burners of the atmospheric type, the products of combustion being discharged by induced draught fans. The gas supply to one burner is controlled by a pneumatic valve, the setting of which responds to changes in Dowtherm pressure within the vapourizer. This pneumatic control system also controls the air supply to the burner. A second pneumatic system controls the return of condensate from the collecting tanks, thus keeping uniform the liquid level in the vaporizer. Flame failure safety devices are incorporated in the burner control system.

The vaporizers are equipped with safety valves to comply with legal requirements. Were these to operate in the normal way, loss of Dowtherm would result and intermediately set high pressure cut-outs to cut off the gas supply are installed.

### Venting Equipment

When using a condensing vapour such as Dowtherm, it is necessary to evacuate the system before starting up. It is also necessary at intervals to remove any accumulated gaseous products resulting from degradation of the Dowtherm itself. In addition, the units have to be cleaned on occasion, and Dowtherm has to be evacuated from them before they may be removed from the system. Vacuum venting equipment is, therefore, provided. Incondensable gases are discharged to atmosphere, any entrained Dowtherm vapour being condensed en route and drained to a store tank. A separate set of make-up pumps returns this Dowtherm to the main circulating systems.

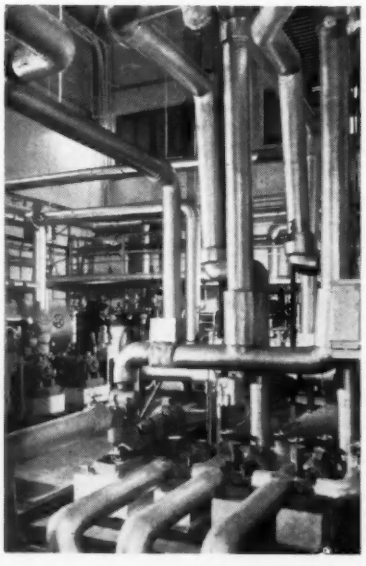
In time, accumulation of solids occurs due to degradation which can lead to priming in the vaporizers, and a small still is installed for occasional batch cleaning operations.

Serious losses occur in the process if the heating fails for more than a few minutes. To avoid the effect of a failure in the electricity supply, a stand-by diesel engine driven generator is installed having sufficient output to feed the essential pump and fan motors. It also provides power for an emergency compressor set capable of supplying sufficient air for the automatic control system.

The installation has worked well, and, helped by the uniform load on the plant, it has been possible to control the temperature of the Dowtherm vapour within a range of 1°C.

The catering department at B.N.S. provides meals for some 4,800 people, including a 24-hour service to suit shift workers. All the rolls and cakes served in the canteens and on the trolleys which take tea to the production areas and to the offices are made on the premises.

*Preparing nylon warps. There are three-and-a-half miles of nylon yarn in a pair of nylons.*



*Part of the Dowtherm boiler-house showing the pipes carrying the Dowtherm, the condensing vapour used as a heating medium for the melt-spinning of nylon yarns.*

The gas-fired equipment in the main plant canteen consists of six general purpose ovens with solid top boiling rings, two roasting ovens, and a four-pan deep fryer. In the central canteen the equipment comprises seven general purpose ovens with solid top boiling rings, a roasting oven, two two-pan deep fryers, four vegetable boilers, a steaming oven, five hot cupboards, a Stotts Connoisseur tea and coffee boiler, and a Jackson water boiler. In the bakery a double baking oven, a Collins baking oven (gas heated and steam injected), and two provers are in use.

Total number of meals served in both canteens per annum amount to: Soup, 27,500 gal.; main dish, 717,500; sweets and snacks, 1,061,300. Bakery production per annum is 65,000 doz. rolls and 45,000 doz. cakes.

The B.N.S. plant at Pontypool is the largest factory in Europe for the production of nylon yarns—no finished goods are made—and Britain is now the second biggest producer of nylon yarns in the world, the U.S.A. alone producing more.

### Processing the Yarn

Nylon polymer chips, which arrive at the factory in specially made containers each holding 4½ tons, are melted in hoppers and the molten polymer extruded through spinnerets. These finely extruded strands are wound up on cylinders and are then stretched mechanically to approximately four times their original length; it is at this stage that the yarn acquires its characteristic properties of strength and elasticity. The drawn yarn then goes through a series of further processes, such as winding, uptwisting, gumming and coning, depending upon the purpose for which the yarn will eventually be used. In the warping area, nylon warps are prepared for weavers of nylon fabrics.

Leaving this £8 mill., 600,000 sq. ft. factory—a masterpiece of modern industrial architecture set in magnificent sweeping gardens in a peaceful valley—the party set out on their homeward journey.

They carried with them a very real appreciation for the excellence of the arrangements and facilities provided by the Gas Council and the Wales Gas Board, and for the cordial welcome they had received at each factory visited.

# The Great Yarmouth Group . . . . . a case for integration?

By J. H. GREENACRE, J.P., M. Inst. Gas E.

Group Manager, Great Yarmouth Group, Norwich Division, Eastern Gas Board.

***In his farewell address as Chairman of the Eastern Section of the Institution of Gas Engineers, Mr. J. H. Greenacre stressed some of the difficulties that are encountered when small gasworks in sparsely populated districts become too expensive to operate, both because their small size makes the spending of capital on labour-saving machinery uneconomic and the cost of ordinary maintenance work is out of all proportion to the income derived from the sale of gas, and because the plant cannot be operated with reasonable thermal efficiency.***

THE Norwich Division of the Eastern Gas Board until recently consisted of 27 separate districts, of which only the Norwich works supplies regularly more than 1 mill. cu.ft. of gas per day. For administrative purposes, these undertakings were divided into three groups, the most easterly having its headquarters at Great Yarmouth. The Great Yarmouth Group consists of nine undertakings, three of which can be considered of a reasonable size and able to employ modern methods of gas production, the remainder being small country or small town works, outputs of which vary from 7 to 36 mill. cu.ft. of gas per annum.

With the possible exception of Beccles, with an output of 35.2 mill. cu.ft. per year, where a manual charging machine is installed, there has been little change in the method of gas production at these five undertakings during the present century.

Although capital expenditure might be desirable from a technical standpoint, the cost would be prohibitive, indeed the cost to one of these works to meet a Factories Act minor safety requirement amounted to no less than 0.75d. per therm. It is quite obvious that it is impossible to obtain a fuel expenditure index better than 33 per cent. from works of this size, and even this figure could not be expected from the smaller ones, which are shut down at night. The excessive cost of process wages is evident, and when it is realized that the largest of these works employs two men per shift and the others only one, it will be obvious that there is little which can be done to reduce labour charges.

## Use of a Butane/air Plant

The Gas Act of 1948 imposes a legal obligation to continue gas supplies to these communities. It has, therefore, become necessary to examine other means of providing an economical and efficient supply, and this must of necessity mean the abandonment of these production plants. The cost of integration in sparsely populated rural districts is bound to be high; therefore in 1952, the Eastern Gas Board decided as an experiment to install a Holmes-Mallet type butane/air plant at the Bungay works, where output is 63,000 therms per annum with 400 consumers. This works was selected because of the poor condition of the gas-making plant, its comparatively isolated position, and the high cost of manufacture. In the half year ended September, 1952, before the installation of the butane/air plant, the cost of gas into holder amounted to no less than 23.0d. per therm, and had it not been for the installation of the butane plant this figure might well have risen to 28.0d.

The function of the plant is to convert commercial liquid butane into the vapour phase and dilute it with air to form a mixture of a convenient calorific value for distribution. A fairly wide choice is available, and it was decided on a calorific value of 720 B.Th.U. per cu.ft. Commercial liquid butane consists of a mixture of approximately 90% butane and 10% propane, and is transported by road to Bungay in steel cylinders holding about 2,300 lb. of liquid, equivalent to 490 therms. The cylinders are housed in a suitable storage bay, capable of holding twelve cylinders and provided with the necessary lifting gear. The empty cylinders are sent to the refinery for refilling, normally in loads of three. Each cylinder contains about 2½ days' supply of butane, and therefore the maximum stock is seldom more than sufficient for 21 days gas making. This compares unfavourably with the stock of coal usually held at a works, but so far this has given no cause for alarm. The vapour is withdrawn from a governor bell by a Connersville booster and bubbled through a benzole seal to preserve meter leathers and to impart a distinctive smell to what would otherwise be an almost odourless gas. The butane vapour then passes to the mixing chamber where it meets a stream of air provided by a second Connersville booster, the air having already been cleansed by passage though a gas oil seal and a bed of Lessing rings.

## Stringent Precautions

It will be appreciated that the general principle of the plant is simple in operation, but it will be realized that when dealing with liquid butane and butane vapour very stringent precautions have to be taken to prevent accidents. All electrical equipment is of the flameproof pattern. The plant automatically shuts down, and a warning Klaxon sounds giving adequate warning to the plant operator should the need for attention arise from any of the following causes:—

If the supply of butane fails, an undue increase in pressure in the works mains, the blower on either the air or butane supply fail, the calorific value of the gas vary by more than ± 10 B.Th.U. from the declared value, the pressure or temperature of the gas leaving the vaporizer rise above a predetermined figure.

A series of warning lamps on the electrical control panel indicates which section of the plant is at fault. These precautions ensure the safety of the plant.

From a production point of view the plant has proved singularly free from trouble. The calorific value of the gas is constant and equal, if not superior, to the best works practice.

Before butane/air gas could be distributed a very considerable amount of work was necessary on the district. Mains and services were in poor condition, and the volume of gas unaccounted-for amounted to 16.84%. It was decided, therefore, to test all mains and services and repair where necessary, and 154 joints were recaulked and 45 services relaid. After this work had been done it was very disappointing to find that at the end of the first full year's working on butane/air gas, the unaccounted-for had risen to 19.6%. Further work was carried out on the district, and 14% of the total length of main and 15% of the services relaid, but by the end of the following year the unaccounted-for gas had only fallen to 17.5%.

The cost of installing the Holmes-Mallet plant, together with the buildings, amounted to £9,400, representing a capital expenditure of 1.45d. per therm. The charge of conversion of the distribution system and consumers' appliances to receive butane/air gas was £4,700, equivalent to a revenue charge of 24.5d. per therm in a full year's working. The installation

of the plant has made a direct saving to the Board of 5.0d. per therm, or £1,030 per annum. The cost of butane/air gas produced for the year 1955-56 amounted to 21.26d. per therm, of which 7.61d. was in respect of transport costs from Stanlow in Cheshire. The Board's vehicles are now used to transport the liquid butane from Shell-Mex and B.P. distillation plant at Shell Haven, and this has reduced transport costs to 3.03d. per therm. The present cost of production at 16.68d. per therm must still be considered fairly high. This, coupled with the difficulties of unaccounted-for gas already commented upon, make it apparent that plants of this type will not always provide the answer to the problem of economically supplying gas to small communities where integration with larger units is a practical proposition.

Electricity has proved to be a considerable help and by installing electric prime movers the power charges have been reduced by 64%.

The three main works in the Group—Lowestoft, Great Yarmouth and Gorleston—provide more scope for technical control and improvement in manufacturing costs, and their position on the coast makes it possible to obtain supplies of seaborne coal. These works, therefore, make for possible basis for integration, but the Great Yarmouth works being practically surrounded by sea and the tidal waterways of East Anglia, make the cost of bringing this works into any scheme of integration great.

Although the Great Yarmouth works was reconstructed as long ago as 1921, the results obtained can be considered satisfactory from a works of this size. This is largely due to the excellent design of the horizontal retort settings which enable high heats and heavy charges to be maintained. The retorts are operated on a 12 hour carbonizing cycle, thus allowing the two-shift system to be operated, keeping the number of stokers employed to a minimum. Working results show a Fuel Expenditure Index for this Works at 23.7%, a thermal yield of 74.5 therms per ton for an expenditure on carbonizing wages of only 1.28d. per therm.

The installation of portable conveyors for handling costs, together with new condensers and an electrostatic detarrer, have combined to reduce the labour costs of dry purification by 30%.

### Methods of Unloading Coal

The works is situated some 200 yards from the river Yare where seaborne coal is brought in vessels carrying 400 to 500 tons. For the past 68 years coal has been unloaded by means of a hydraulic crane lifting skips of coal from the boat and lowering them on to a horse-drawn trolley to the works where the skip is discharged into the breaker pit.

To bring this method of unloading coal more into line with modern methods, the hydraulic crane, built in 1888, was fitted with a grab discharging coal into a suitable buffer hopper feeding a seven-ton tipping lorry to carry the coal to the breaker pit. This revised method of unloading vessels will reduce the cost of coal into store by £2,465 per annum, equivalent to 2s. 6½d. per ton.

With the advent of the Beaver Report, it was felt that the existing coke screening plant was unable to produce a fuel of the required standard and it has been decided to install a modern screening plant. In designing the plant, allowance has been made for an increase of 25% in the carbonizing capacity of the works and provision made for a full two days' storage in the hoppers.

With these improvements, the Yarmouth works may be considered efficient, and it will operate as a separate unit for some time to come. Any Group integration scheme based on existing plant may therefore be centred on either Lowestoft or Gorleston works.

The combined gas-making plant at the Lowestoft and Gorleston works is more than sufficient to satisfy the requirements of the group for the present, but of the two undertakings, the larger is Lowestoft, which had an output of 367 mill. cu.ft. in the financial year 1955-56, having grown rapidly in recent years. Since the beginning of the war the output has increased by 102%, and it has only been possible to meet this demand by the production of some 40% of carburetted water gas at a cost of 2d. per therm more than coal gas and reduce the coke available necessitating imported supplies. The site of this works, standing as it does on the most easterly point in the British Isles, has given much cause for concern. Not only has the works been flooded no less than four times in the present century—it was out of action for a week during the floods of 1953—but it is questionable whether the coastal defences are adequate to prevent permanent encroachment by the sea. Expert opinion on this point is now being considered. Surplus manufacturing plant was, however, available at Gorleston, and it was decided to interlink the two works making Gorleston a base load station and enabling the quantity of water gas made at Lowestoft to be reduced to that required to meet peak loads and for the dilution of horizontal retort house gas.

The Gorleston works, situated eight miles to the north of Lowestoft, made some 130 mill. cu.ft. of gas before integration. The gas-making plant consists of eight Woodall-Duckham continuous vertical retorts and a modern automatic water gas plant with capacities of 720,000 and 500,000 cu.ft. of gas per day respectively. There was a potential surplus of approximately 350,000 cu.ft. of coal gas available for Lowestoft, the Gorleston water gas plant being available to meet emergencies. To make full use of this manufacturing plant it was necessary to increase the capacity of the wet purification system. Accordingly, in 1953, new condensers, detarrer and ammonia washer were installed to deal with the increased outputs which were envisaged. To reduce the cost of coal, a wharf crane was obtained so that coal could be brought by the sea and unloaded direct into the works instead of using railborne supplies as had hitherto been the case. This effected a saving of no less than 8s. per ton.

### The Gorleston-Lowestoft Main

The medium pressure main joining the two works was laid in the same year and was designed so that gas could be pumped from Lowestoft to both Gorleston and Yarmouth, and alternatively from Yarmouth to the remainder of the Group, should it ever become necessary to do so. The cost of laying this main was about £43,000, or about £2 15s. a yard, equivalent to 1.0d. per therm, based on a load of 100 mill. therms.

Since Gorleston has become a base load station, the waste heat boiler installed with the vertical retort house supplies the whole of the works steam requirements, including that of compressing the gas for Lowestoft; a suitable compressor was already available for this purpose. Under these conditions compressing costs are very low, being approximately 0.03d. per therm. However, a diesel driven Roots type compressor was installed for a standby.

The integration of these two works has already shown a saving to the Board, and in spite of a general increase of some 10% in the cost of coal, wages and other materials, the cost of production has not materially increased. In fact, the cost of gas manufacture between the years 1953-54 and 1955-56 shows a saving of 0.43d. per therm.

With a possible annual increase in demand of 1.5%, the output of gas will amount to 800 mill. cu.ft. per annum by 1970, with a maximum daily demand in the region of 3 mill. cu.ft.

In order to meet this output some additional gas-making plant will be required, and the question arises as to whether this should be of a conventional pattern or whether, and to what extent, catalytic oil plants should be used. In spite of the Lowestoft works being most favourably situated geographically as a distribution centre for the various districts in the Group, the more modern plant at Gorleston and its favourable situation for the receiving and handling of coal and oil makes it the more suitable for manufacturing purposes.

There are three schemes upon which the integration of the Group might be based. The first is that all manufacturing plant should be situated at Gorleston, which would involve the extension of the existing retort house, together with some purification and coke handling plant and the addition of an oil gas plant. The second scheme would continue to use the existing plant at Gorleston, and the remainder of our requirements would be met by an oil gas plant sited at Lowestoft, leaving the modern carburetted water gas plant to meet peak demands. Of these, the latter would prove the more economical as far as capital charges are concerned, but a cheaper cost of production will be obtained under the first scheme. The third alternative is that the whole of the existing manufacturing plant should be abandoned, and the requirements of the local integration scheme be met by a catalytic oil plant erected at the Lowestoft works using some of the

existing ancillary equipment. This scheme would undoubtedly produce gas at the cheapest cost per therm, but the complete replacement of the existing gas-making plant would involve high capital charges. At the same time, the complete cessation of coal gas manufacture would make it necessary to import some 15,500 tons of coke into the area at a cost to the Board of £11,000 per annum, equivalent to 0.7d. per therm.

The ultimate decision may well depend on the result of the survey of sea defences at Lowestoft, and should this prove unfavourable, the existing works may have to be abandoned. The general policy of using oil as a basic raw material will also have to be considered.

While there is little doubt that at present prices the production of oil gas is an attractive proposition, the fact remains that the carbonization of coal may well continue to be one of the basic processes of the industry for some time to come or at least during the useful life of the existing coal carbonizing plant. The continued rise in the cost of coal is therefore of serious concern; not only has this risen considerably but there has been a deterioration in certain qualities. In 1951 the average ash content of a Durham coal as regularly supplied to Lowestoft works was 7.3%, but this figure was increasing steadily and by 1955 it had reached 9.8%. During the same period the pithead price increased by 26s. 6d. per ton.

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# Liquid Gas . . . *an investigation*

**By JOHN D. CRECCA, Jnr.**

## PART IV.

In dealing with the proposed ship and shore installations in the system, greater emphasis is placed on the design of the ship's equipment, for two reasons. As was seen from the previous chapter, the liquefaction of methane is not new. Thus, many lessons of previous experience may be used. On the other hand, the proposed ship design is new. Ships have been converted or constructed to carry chemical cargoes or refrigerated cargoes but none to carry a cargo under such extreme conditions.

A second reason for the apparent emphasis on the ship design is that many of the features involved in the ship design carry over to the short installation. The most notable of these are the materials used and the insulation.

### Proposed Liquid Methane Carrier

The reasons for choosing a T2-SE-A1 tanker have been stated previously. It will now be desirable to look into the alterations necessary to suit the new use.

The salient features of the conversion are:

(a) The installation of stainless steel ('18-8') rectangular tanks for the storage of liquid methane in the present centre-line row of eight cargo oil tanks and in the two small forward cargo oil tanks, port and starboard. The tanks have a total volume of approximately 160,000 cu.ft. inside the insulation.

(b) The installation of insulation to a total thickness of 12 in. on the inside of the smooth sides of the methane tanks.

(c) Installation of a new oil-tight inner bottom through the existing centre-line row of cargo oil tanks forming the lower boundary of the new compartments, in which the liquid methane storage tanks are located. This inner bottom also serves as a tank top over the existing bottom shell framing usually called floors, thus forming a longitudinal series of double bottom oil tanks to be used for cargo oil. In addition, new floors (frames) are proposed under the inner bottom intermediate between the existing floors to provide supports for the new inner bottom and the methane storage tanks.

(d) The provision of insulation on the interior boundaries of the newly formed compartments in which the liquid methane tanks are located.

(e) The installation of a liquid methane piping system for filling, suction, and discharge of liquid methane to and from the methane storage tanks to connections to the side of the vessel.

(f) The installation of an inert gas generator system for the provision of inert gas in the void spaces between the methane storage tanks and the boundaries of the newly formed compartments in which the methane storage tanks are located, for filling the methane tanks with inert gas when the methane is being pumped out, and for purging the methane pipe lines of liquid methane or methane gas when the system is secured.

(g) Retention of the existing wing cargo oil tanks as such and the use of the newly formed double bottom compartments referred to for cargo oil. Thus, the existing cargo oil piping system, pumps and pump room are retained.

### Liquid Methane Storage Tanks

Liquid methane storage tanks are the major items in the conversion from the point of view of area affected, function, construction, and cost.

The location for these tanks in the centre-line row of the existing cargo oil tanks was selected as most suitable from consideration of heat transfer, protection in case of collision, and adaptability and size of these spaces for the installation of rectangular tanks.

The use of the ship's structure forming the existing centre-line row of cargo tanks as boundaries for the methane tanks was considered to be unsafe, even with insulation on the inside of the tanks. It is considered inadvisable to assume that in such case the insulation would remain intact and impervious for very long. The fitting of insulation on irregular surfaces, such as brackets, longitudinals, stiffeners, transverse framing, would be at best a very difficult job. Besides, the working of the ship's structure in a seaway would lower the chances of the cemented joints remaining intact, and the liquid methane would soon find its way to the medium steel hull of the vessel. No such chance can be taken because low temperature liquid methane, on the medium steel-strength members of the vessel, could possibly result in structural failure of the hull when it is subject to high alternating stresses as it is in a heavy seaway. Therefore, separate individual methane storage tanks are proposed, each in one of the existing centre-line cargo tanks and made of material suitable for use at −260°F. This isolation of the individual tanks by heavy structural bulkheads provides some measure of protection in case of accident or fire.

To utilize the space below the level of the 5 ft. deep bottom shell floors (frames) would require projections between each

pair of floors from the main rectangular part of each methane tank, thus complicating the construction of these tanks and their supports, complicating the filling and suction piping, and consequently increasing the cost of the tanks out of proportion to the added volume. Besides, these projections would extend too close to the bottom shell of the vessel and, therefore, would be readily exposed to damage in the case of grounding of the vessel. To fit shallow individual tanks between the shell floors would be even more objectionable than the projections. It was therefore decided to build the methane tanks above the level of the shell floors.

### Selection of Metal

The question of the type of metal to use in the construction is very important. It is general knowledge that ordinary metals of construction (such as medium-carbon steel) become very brittle at low temperatures. Thus, special alloys must be used. The question may arise as to why special alloys should be used if the insulation will be on the inside of the tank. But without this precaution the risk is too great, in the light of the Cleveland incident, and the consequences too far reaching if liquid methane reaches the medium steel metal tank boundaries of the tank. It is realized that the largest single item of cost of conversion is the cost of the storage tanks. However, it is the high direct labour cost, due to having to install the tanks in place on the vessel (the difficulty in passing plates down, the restricted working space, etc.), along with the corresponding overheads, that account for the greatest part of the cost of these tanks.

The two reports on the Cleveland incident as well as other literature covering metals at low temperature[13] indicate that the use of a material having high nickel, high copper, or aluminum is best. This points to the selection of one of the following metals:

(a) Various aluminum alloys suitable for structural work.

(b) Copper-nickel alloys either 70% copper 30% nickel or 90% copper 10% nickel.

(c) Monel metal composed of 60% nickel and 23% copper.

(d) The stainless steels.

At first it appears that the aluminum may be advantageous because of its light weight. However, this is offset on two points. The price per lb. of aluminium plates to the width of 60 in., proposed for the sides of the tanks, in $\frac{3}{8}$ in. to $\frac{1}{2}$ in. thickness is about equal to the price of the '18-8' stainless steels. If narrower plates are used to obtain a lower price per lb., then the direct labour increases due to the larger number of joints to weld.

The second drawback to the use of aluminium is involved with its use in girders and beams. To provide equal stiffness to that of the stainless steel, the T-bar stiffeners would have to be deeper. These deeper stiffeners would reduce the already narrow clearance between the tanks and the ship's structure (24 to 30 in. on the sides). If closer spaced stiffeners are used, the labour cost of welding the additional stiffeners would increase. The welding of aluminium to realize proper strength of joints requires special techniques and equipment.

The copper-nickel alloys would not have adequate strength or ductility.

Monel metal compares favourably with '18-8' stainless steel in tensile strength in the annealed condition, but the ductility is not as good as stainless steel. The cost of monel plates $\frac{3}{8}$ in. to $\frac{1}{2}$ in. thick in the annealed condition compare unfavourably with stainless steel.

Stainless steel clad on a medium steel base was considered, but rejected because of low tensile strength (55,000 lb. per sq. in.) and ductility (25%).

It is apparent, therefore, that '18-8' stainless steel is the best from all points of view. It will be worth while at this point to find out why '18-8' stainless steel is the best from a physical point of view.

So far the term '18-8' stainless steel has been used. However, for best qualities at low temperatures austenitic stainless steel should be used. Ferritic and martensitic stainless steels do not have nearly as good low temperature properties as austenitic. Austenitic stainless steel when properly annealed is well suited for low temperature processes, when maximum toughness is required.

Although there is some question as to the effect of grain size upon the low temperature embrittlement of steels, it is generally believed that fine grains are the best for low temperature work.[5, 14]

Carbon seems to be the most damaging element. It increases the transition temperature (temperature where embrittlement becomes critical). A carbon content over 0.15% is not recommended[5], while a content of less than 0.10% is desirable. Nickel, manganese, and chromium are beneficial in that they lower the transition temperature.

By applying the facts discussed above, it would appear that the best steel to choose would be an austenitic annealed stainless steel. Three types of stainless steel were investigated with the best all round qualities. Although the properties of these three were very similar, as may be expected by checking the chemical composition, one type, 304, appeared best when comparing ductility, tensile stress, impact resistance, etc., at temperatures around −300°F.

Thus to summarize the discussion, the type 304 stainless steel was chosen because:

(a) It had high nickel content. There is 8% to 11% in the various types made. This percentage of nickel is considered essential for use with temperatures as low as −260°F. At these low temperatures the ductility of the '18-8' stainless steels is not appreciably reduced.

(b) The cost of the material compares favourably with the other alloys considered.

(c) The material is commercially available in a range of sizes and thickness for both plates and shapes suitable for structural work.

(d) This material has had extensive applications as a structural material for special applications in shipbuilding and repair work, and shipfitters and welders are experienced in using it.

(e) Welding of the '18-8' stainless steel is a tried and proven process. Either the so-called '19-9' or '25-20' stainless electrodes are used for welding the '-18-8' steels. These electrodes are also used for applications requiring high impact value. Therefore, the initial Charpy value of the weld should be high.

### Welded Joints

Though the selection of the '18-8' stainless steel is considered the proper one for the methane storage tanks, it is to be remembered that no structure is better than the strength of its joints. This means the adoption of proper electrode materials, welding procedure and technique, and the proper supervision and inspection.

It is obvious that welded joints are the only joints suitable for these tanks in view of the extreme necessity for obtaining tight joints, as well as joints of adequate strength.

The micrographic and macrographic tests of the welded joints of the No. 4 Tank that failed structurally in the East Ohio Gas Company disaster, made after the disaster, as shown in the Technical Report of the Mayor's Committee and the Report of the Bureau of Mines, indicates conclusively that there was poor supervision and inspection in the welding of these joints. The blow holes, voids, and the distorted and unsymmetrical weld deposits support this conclusion.

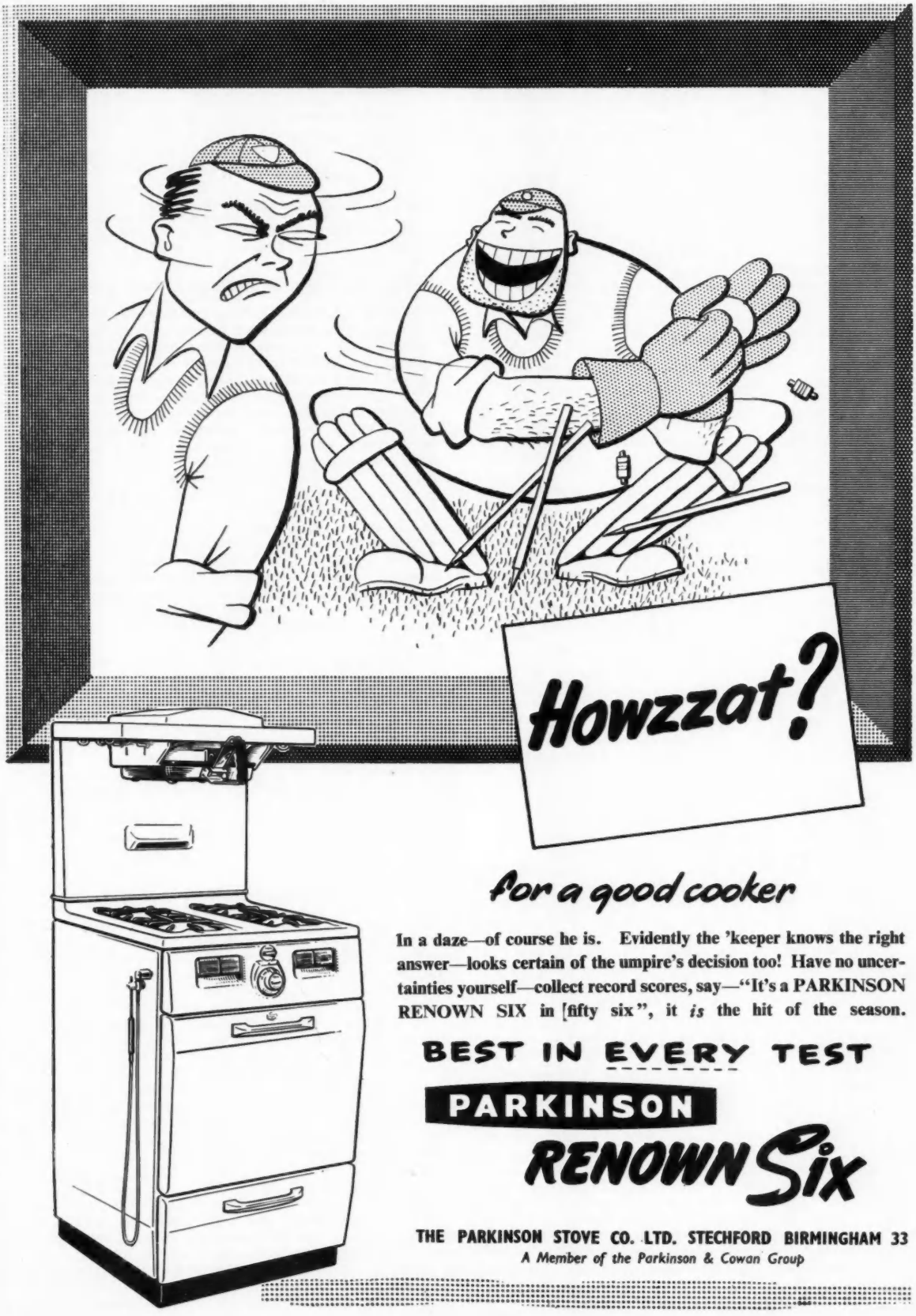
In view of this, the following procedure in the construction of these tanks is recommended.

(1) Preliminary tests should be conducted with the several types of '18-8' stainless steels to confirm the theoretical work. These tests should be made with both the intact material and with welded joints. Nevertheless, each heat should be inspected as noted in Section III.

(2) Standard tensile, bend and impact (Charpy or Izod) should be conducted on specimens of '18-8' after immersion in liquid nitrogen. These tests should be made on both intact plate specimens and corresponding forms with welded joints. It is believed that the low carbon '18-8's are best suited not only because of lower carbide precipitation in welding but also for impact strength at low temperatures. The effect of titanium and/or columbium for those classes of '18-8' that use these elements, on the impact strength of the material at low temperatures should be determined.

[13] 'Mechanical Properties of Metals at Low Temperatures', National Bureau of Standards Circular 520, U.S. Govt. Printing Office, Washington, D.C., May 7, 1952.

[14] Sisco, F. T. 'Modern Metallurgy for Engineers', 2nd Ed., Pitman Publishing Corporation, New York, 1948.




*For a good cooker*

In a daze—of course he is. Evidently the 'keeper knows the right answer—looks certain of the umpire's decision too! Have no uncertainties yourself—collect record scores, say—"It's a PARKINSON RENOWN SIX in fifty six", it *is* the hit of the season.

BEST IN EVERY TEST

PARKINSON

RENOWN SIX

THE PARKINSON STOVE CO. LTD. STECHFORD BIRMINGHAM 33

*A Member of the Parkinson & Cowan Group*

(3) The weld tests made in (2) should be performed not only to determine the best of the '18-8' types of steel to use, but also to establish a norm for qualifying production welders for the job. Both the '19-9' stainless electrodes and the '25-20' stainless electrodes should be tried.

(4) Qualify all production welders for this work based on the norm developed as above.

(5) X-ray or Gamma-ray *all* welded seams and butts of the tank plate boundaries. Make spot check inspection with X-ray or Gamma-ray for the fillet welds of the belt framing around the tanks. Make magnetic flux inspection of the welding attaching the T-stiffeners to the tank shell plating.

The general construction and scantlings of the methane tanks show the type of connection of the tank web frames (through which the tank is supported) to the ship's structure. This has not been developed in detail, but it is proposed that elongated bolt holes be judiciously located in the connecting members to allow for movement due to shrinkage as is done in steam turbine foundations on ships. This expediency is advocated despite the use of insulation on the inside of the tanks because there is also the possibility of liquid methane permeating a joint in the insulation after some exposure to racking and deflection of the vessel in a seaway.

### Methane Storage Tank Insulation

It is proposed to fit the methane storage tank insulation on the inside of the tanks as is being done on the methane storage tanks of the barge built for W. L. Morrison at the Ingalls Shipbuilding Corporation, Pascagoula, Mississippi. There are two reasons for this. First, it is applied on the 'warm' side of the structure, thus making it possible to use cementing compounds or adhesives that are suitable for normal temperatures. Also, the adhesive will be less subject to the alternating thermal stresses, which occur when the tank is filled and emptied, if the insulation is on the outside of the tank shell. However, with the insulation on the inside of the tank and thus exposed to the −260°F. temperature of the liquid methane, the thermal stresses in the insulation will probably become appreciable in the range of temperatures to which the insulation will be subjected. Considerable experimentation will be required to determine the ability of the proposed insulation to withstand these thermal stresses.

The other reason for placing the insulation on the inside, that of moisture migration, has been discussed in Section II.

The insulation chosen for this design is 'Styrofoam,' which is a trade name for Dow Chemical's polystyrene. This substance meets the desired requirements in weight, conductivity, permeability, and safe loading under foot. A combination of 10 in. of 'Styrofoam' and 2 in. of balsa wood has been chosen. This thickness gives a heat loss of 5.4 B.Th.U. per sq. ft. per hour, which is close to an approximate term of 5 B.Th.U. per sq. ft. per hour used in the cold storage industry for desired heat loss.

The balsa wood was added to give better shear strength. However, at present, work is being done on a 'Styrofoam' sheet covered on both sides with a matting impregnated with an epoxy resin. This forms a surface that may be impermeable and is strong. It is possible that some of the new isocyanate foams may be suitable.

The type of adhesive to use has not been determined. There are a number of problems that must be solved such as the effects of thermal shock on the binder itself and the substances it is binding, or the effects of liquid methane on the binder, *etc.* It is, therefore, strongly recommended that some experimental work should be done on the binder and the insulation at low temperatures.

The question of the effect of the curvatures and corners on heat transfer arises in determining the insulation thickness and heat losses. The effective area is ordinarily taken as the mean of the inner and outer area. However, at corners and curved surfaces, this will cause errors. Thus a correction factor must be applied. In these cases the relaxation method is used.[18] The correction factor depends upon the ratio of the insulation thickness to the diameter of the container. As this ratio decreases, the need for correction decreases. Since in both the ship and shore tanks, the figure is very small, this correction was neglected.

[18] MacAdams, A. H., 'Heat Transmission' 3rd Ed., McGraw-Hill, New York, 1954.

The principal characteristics of these tanks are:

| | |
|---|---|
| Capacity and volume inside of insulation: | |
| Eight large tanks | 513,261 cu. ft. |
| Two small tanks | 6,500 cu. ft. |
| Total net volume | 159,716 cu. ft. |
| Approximate total volume free methane gas | 96,000,000 cu. ft. |
| Total capacity in therms | 960,000 therms |
| Total weight liquid methane 100% full | 4,152,616 lb. |
| | 1,860 long tons |
| Total practical cargo load liquid methane, 92% capacity | 1,711 tons |
| Weight of methane storage tanks, metal ('18-8' stainless steel) | 930,994 lb. |
| Insulation | 110,225 |
| | 1,041,219 lb. |
| Estimated cost of the liquid methane tanks—(metal) | $1,564,000 |
| Insulation | 326,000 |
| Total | $1,890,000 |

### New Inner Bottom and Double Bottom Floors

The space below the level of the top of the 5 ft. deep floors (bottom shell structural frames) and the bottom shell of the vessel cannot be advantageously utilized for the stowage of methane as pointed out previously. Therefore, this space would be wasted unless an inner bottom were fitted over the existing floors. To adequately support this inner bottom, intermediate floors are proposed between the existing ones. This inner bottom also serves to confine the dissemination of liquid methane through recesses and pockets around the brackets and framing of the shell should any of the methane storage tanks spring a leak. To avoid the deleterious effect of such leaking liquid methane on the ordinary medium steel of the inner bottom, 6 in. of 'Styrofoam' insulation is provided over this new inner bottom.

A major effect of the inner bottom is to save, for use as cargo oil, a portion of the original cargo oil spaces lost by the utilization of these spaces for the liquid methane tanks. The cargo oil capacity of the new double bottom tanks formed by the installation of the inner bottom is estimated to be 9,040 barrels at 100% capacity, or 8,860 barrels at 98% full.

It is proposed to apply insulation 12 in. thick on the underside of the upper or main deck (which is the weather deck) to protect the methane storage tank rooms from the radiant heat of the sun as well as the ambient temperature of the outside atmosphere. On the pressed panel sides of these rooms, it is proposed to use 3 in. of fibreglass insulation to provide thermal protection for the tank rooms from the wing cargo oil tanks, especially when the oil is heated for pumping over the side. On top of the new inner bottom 6 in. of 'Styrofoam' insulation is proposed, not only for thermal protection from the new cargo oil in the double bottom but also to provide an impervious insulating surface to protect the medium steel inner bottom from liquid methane should it drip down from a leaky methane tank.

### Liquid Methane Piping System

This system consists of two 2,000 gal. per minute, 200 ft. total head methane pumps each driven by a 70 H.P. motor, connected to 8 in. discharge and suction lines, thence to 6 in. lines and two 6 in. manifolds from which a separate 4 in. filling and suction line leads to each methane storage tank. The pumps, 8 in. and 6 in. piping and manifolds are located in a newly designated liquid methane pump room on the upper deck (weather) under the midship deck house, formerly designated as 'bridge space.' It is not believed that it will be necessary to use all of this space, since it must be available for passage fore and aft on the upper deck, and the pump room and piping will be confined to a space formed by new longitudinal bulkheads just inboard of the outboard doors in the forward side and after side of the house.

While the total capacity of the methane tanks is 1,196,000 gal., the practical carrying capacity is 92%, or 1,100,320 gal. Therefore, each of the 2,000 gal. per minute pumps is capable of unloading the methane tanks in slightly over nine hours.

However, the pipe and valve arrangement is such that one pump could pump out the forward group of tanks while the other pump emptied the after group of tanks or vice versa. To permit this operation, the valve at the extreme end of the 8 in. cross connection line would have to be a stoplift check valve.

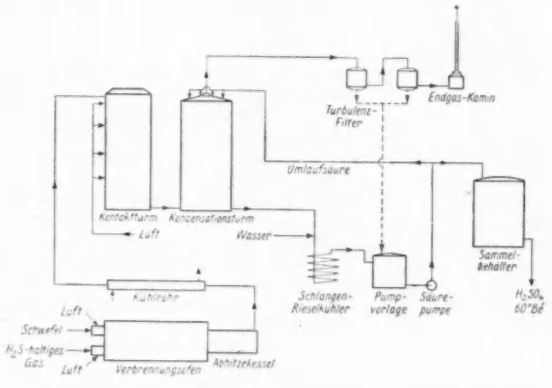
(*To be continued*)

# GAS IN GERMANY

## ABSTRACTS FROM RECENT PUBLICATIONS

## Sulphuric Acid Plant at Berlin-Mariendorf Works

The new ammonium sulphate recovery plant of the Berlin-Mariendorf gasworks requires considerable quantities of sulphuric acid. In order to have assured continuity of supply, it was decided to erect on the same site a modern plant which is capable of producing 42 tons of 60 Baumé (78% strength solution) sulphuric acid in 24 hours by the wet-gas catalytic process. As the plant at Mariendorf has to process additional quantities of liquor supplied from outside sources, the sulphuretted hydrogen contained in the gas is inadequate, and supplementary quantities of acid have to be produced by the combustion of elementary sulphur, recovered from the dry purifier plants of other Berlin gasworks. Catalysts used to necessitate prior drying, but the vanadian contacts which are now used in the contact process are resistant to steam at temperatures up to 500°C., thus making the wet-gas process possible. This process, the flow diagram of which is shown in the illustration, does not produce a concentrated acid, but the acid obtained is perfectly suited to the saturator process. Experience has shown that a steady production of 42 tons in 24 hours can be maintained, and that up to 50 tons per day can be produced intermittently. The acceptance test, based on 40 tons of sulphuric acid per day, proved a $SO_2$ to $SO_3$ transformation ratio of 98.1%, 99.8% of the $SO_3$-gas fed into the process was absorbed and condensed.




*New Sulphuric acid plant of the Berlin-Mariendorf gasworks.*

| | |
|---|---|
| *Luft* | air |
| *Schwefel* | sulphur |
| *$H_2S$-haltiges Gas* | gas containing $H_2S$ |
| *Verbrennungsofen* | combustion furnace |
| *Abhitzekessel* | waste heat boiler |
| *Kontaktturm* | contact column |
| *Kondensations turm* | condensation column |
| *Wasser* | water |
| *Umlaufsäure* | re-circulated acid |
| *Turbulenzfilter* | turbulent flow filter |
| *Endgas-Kamin* | waste gas chimney |
| *Schlangen-Rieselkühler* | trickle cooler with coils |
| *Pumpvorlage* | seal pot for pump |
| *Säurepumpe* | acid pump |
| *Sammelbehälter* | storage tank |
| *Kühlrohr* | aftercooler |

**A. Hoffmann:** *Das Gas Und Wasserfach*, Vol. 97, No. 9, May 1, 1956, p. 372

## New Ammonium Sulphate Recovery Plant

The new ammonium sulphate recovery plant at the Mariendorf section of the Berlin Gasworks Company is laid out for the semi-direct process rather than the usual indirect process. The latter would have necessitated large quantities of flushing liquor which would have to be stored in large tanks. Steam and labour requirements of the indirect process would have been greater than in the semi-direct process. In its final stage the plant will be capable of handling 72,600 gal. of ammonia liquor produced by the new carbonizing plant plus an additional 33,000 gal. from the Charlottenburg and the Neukölln sections. The process as adopted for Mariendorf differs somewhat from other semi-direct processes where the ammonia from the condensates is distilled in a column by means of steam and added to the gas immediately before the saturators. The liquor from Charlottenburg and Neukölln is added to the liquor circuit of the collecting main via a high-level tank, thus increasing both the quantity of ammonia liquor from the primary coolers and the ammonia content in the liquor and in the crude gas.

The gas passes from the coke ovens to the primary coolers, the electro-detarrers and the $H_2S$-washer, which works on the principle of selective scrubbing by means of ammonia liquor, thus doubling the ammonia content of the cooled and detarred gas. Centrifugal exhausters deliver it to the ammonia saturators and to the secondary coolers. Each of the two saturators is large enough to handle 21.24 mill. cu.ft. of gas per day and to produce 30 tons of ammonium sulphate. A third saturator will be installed later this year. The saturators are designed by Koppers of Essen, and work to their well-known process. The sulphuric acid of 78% strength is produced in a works-owned plant on the same site. The saturators of 200-in. diameter are of welded steel construction, lead lined and also tile lined. The sulphate from the two centrifuges is fed by belt conveyors to vibrating stepped-gate drying machines and dried by contact with hot air. A weighing device automatically records the sulphate production. A travelling grab crane delivers the loose salt to the sulphate store of 3,000 tons, later 7,000 tons capacity. The sulphate loading plant includes a hopper, crusher, bag filling and weighing machine and a bag conveyor to railway wagons or lorries.

**A. Otto:** *Das Gas Und Wasserfach*, Vol. 97, No. 9, May 1, 1956, p. 369.

## Condensate Economy in Gasworks

While steam and condensate are not primary factors in gas production, their proper economy can appreciably influence the overall economy of a gas plant. The condensate has a high heat content and is practically chemically-pure water—two circumstances which dictate its conservation and proper re-use. On the other hand, under the practical conditions of the gas-making process, both exhaust steam and condensate water are heavily contaminated—with solids, gases, and liquid, chemically-aggressive substances. The equipment for handling condensate in particular has, therefore, to be resistant to corrosion and mechanical abrasion, insensitive to obstruction by solids, and easily cleaned, while also allowing the free escape of occluded or trapped gases. A range of fittings is described, the 'Gestra' designs, which are claimed to fulfil all these requirements to best advantage.

First, is the WK or AWK condensate extractor, an automatic apparatus with a multiple nozzle, adjustable for variable discharge rates of the condensate and capable of operating under fluctuating load, as low as 15% of the full, rated figure. This exhauster can be preset to a particular range of operation, and operated in conjunction with the second item, the 'VKN Vapo-scope' controlling the efficiency of extraction. In the case of an intermittent supply, with occasional complete cessation, float-controlled exhausters have hitherto been preferred; but these have their disadvantages, and a nozzle-type exhauster with bi-metallic, thermostat control, is offered as a better alternative. This, the 'IK' type, also has a multi-stage, adjustable nozzle. A final requirement in a condensate recovery system, is a non-return valve, or valves; the 'Gestra RK' type, all of non-corrosive material, and exceptionally compact, is claimed as the best for this purpose.

**E. Ewald:** *Das Gas-und Wasserfach*, Vol. 97, No. 5, March 1, 1956, p. 205.

# TRADE NEWS

## 'Timinium' Alloy Conveyor Buckets

Hope of long-term economies in coal and coke handling, is claimed following the experimental installation in February, 1954, of two aluminium conveyor buckets at the Windsor Street (Birmingham) works of the West Midlands Gas Board. The experiment was a co-operative venture between Mr. F. J. Bengough, Engineer and Works Manager, and T. I. Aluminium Ltd. The buckets were fabricated by The New Conveyor Company Ltd.

One bucket was fitted to the continuous coke conveyor and one to the coal conveyor. The remaining buckets on each conveyor are the conventional steel type and an excellent opportunity was thus afforded for comparison of performance. Both aluminium buckets are in excellent condition after more than two year's continuous service.

### Severe Impact

The coke conveyor, which is out of doors, receives coke tipped from waggons and loads three concrete hoppers. The buckets are fed from the waggons by a 12-ft. chute of about 45° pitch, which imposes on the bucket a fairly severe impact. The half-hundredweight or so of coke is emptied from the bucket by progressive tipping, controlled by a cam operating on the bucket-carrier frame: the abrasive action of the coke has had no significant effect on the surfaces of the aluminium bucket. A third mechanically testing condition occurs when the emptied bucket is tipped back to the normal position under its own weight, and its forward lip takes the impact against a bar built into the frame, which acts as a front-stop. Whereas many of the steel buckets exhibit damage caused by this impact along the lip, and especially at one edge of the lip, the aluminium bucket shows only a faint, even line and no appreciable denting.

The corrosive conditions are so severe that up to three deep layers of rust can clearly be seen on the steel buckets. As rust forms, it is more and more easily removed by the abrasive action of the coke and a surface revealed which starts to rust in turn. This continuous action causes progressive thinning of the steel to the point of failure. The effective life of steel buckets on the coke conveyors is less than three years. The coke itself often contains quench moisture, which produces corrosion and exaggerates the effects of abrasive scars; spray from the adjacent cooling tower is blown toward the conveyor; and the atmosphere is heavily sulphurous. The resistance of the 'Timinium' alloy to these conditions is such that the bucket is virtually as new.

The frame attaching the bucket to the conveyor is of malleable iron, and was not replaced when the bucket was installed. The two metals are insulated from each other simply by a zinc chromate coating, which has proved entirely adequate to prevent any bi-metallic corrosion.

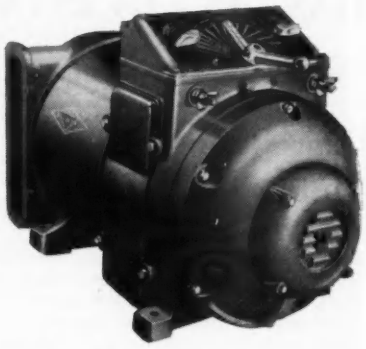
Much the same conditions naturally apply to the coal conveyor, situated within the retort house. Though there is less airborne moisture the coal is often wet on delivery; the impact loading is heavier; and the dust very much thicker. It is noticeable that the combination of corrosion and impact causes holing in the sides of many of the steel buckets, which then need patching, but no sign is visible of such an effect on the 'Timinium' alloy.

Considerable economies in coal and coke handling are foreshadowed by the satisfactory progress of the experiment both in replacement and maintenance and, because of the extraordinarily light weight of aluminium buckets, in the less cumbersome structure and reduced motive power that would be required in a conveyor incorporating them.—*T I Aluminium, Ltd., Redfern Road, Tysley, Birmingham.*

## Welding Generator

Specially designed for welding, the Murex 'Dynex' generator is suitable for D.C. metal arc welding and other processes such as argon arc welding. It can be supplied as motor generator or to be incorporated into all Murex engine-driven equipments. It is twice as fast in voltage recovery as conventional equipment owing to the laminated construction and special design of its field components, while series resistances have been eliminated. A polarity changeover switch is fitted to avoid the necessity of reversing the main welding leads. All controls are simple, and the indicator plate is clear and accurately calibrated, eliminating the need for instruments.

The generator, Type DX002, has a welding rating of 9-14 kW. Its output is infinitely variable from 20 to 400 amps. and the open circuit voltage may be infinitely varied from 70 to 90 volts approximately. Maximum hand welding current is 300 amps. at 30 volts, and maximum intermittent hand welding current 400 amps. at 35 volts. Where the output of the prime mover permits, currents of up to 450 amps. may be obtained. (All ratings are to B.S. 638: 1954.) The generator can be coupled directly through a flexible coupling, or belt drive, to an electric motor, petrol engine, or diesel engine.



*The Murex 'Dynex' welding generator.*

In the 'Dynex' motor generator, Type MDX, the generator and A.C. motor are built into a single carcass and the equipment is suitable for connection to any 380-440 volt, 3-phase, 50 cycle supply. A start delta push-button starter is incorporated in the control panel. A thermal type overload protection device is incorporated in the windings of the motor of the motor generator sets. In the event of sustained overloads causing overheating of the motor windings the device will operate and return the starter to the 'off' position, thus disconnecting the set from the mains. The equipment cannot be restarted until the temperature of the windings has fallen to normal and the device has reclosed.

The 200-300 amp. 'Dynex' motor generator, Type MDX041, has an output infinitely variable from 15 to 200 amps. at 25 volts for continuous hand welding, and up to 300 amps. at 30 volts for intermittent hand welding. Open circuit voltage is infinitely variable from 70 to 90 volts approximately. The 300-450 amp. motor generator, Type MDX002, has an output infinitely variable from 25 to 300 amps. at 30 volts for continuous hand welding and up to 450 amps. at 35 volts for intermittent hand welding. Open circuit voltage is infinitely variable from 70 to 90 volts approximately.—*Murex Welding Processes, Ltd., Waltham Cross, Herts.*

## World Screw Guide

Something historical in engineering, is how the *Robertson Guide to Screw Thread Forms of the World* has been described. The guide shows, at a glance, the multiplicity of screw threads, for 60 forms are illustrated, and 146 series from 21 countries are indexed, together with the reference numbers of relative national standards.

The layout has been designed not only to show all these thread forms together for easy comparison, but they are specially grouped to meet varying requirements. The guide is suitable for wall mounting as well as for desk or library, and colour has been used to aid the eye. —*W. H. A. Robertson and Co., Ltd., Lynton Works, Bedford.*

## Consotrol Controller

The Foxboro M/58 Consotrol controller is an important unit in the well-known Consotrol range of control instruments. This range, including recorders, indicators and controllers is designed primarily for use in graphic panels, and the instruments have virtues of compactness, flexibility and simplicity which permit their use in a wide range of applications. The M/58 is a new development in pneumatic precision control instruments and employs a floating disc force balance system which gives exceptional stability and sensitivity. This simplified balancing system has measurement, proportional, set and integral bellows acting on a single disc. There is only one nozzle and one moving part and the system operates with the minimum of friction and dead space and responds instantly and accurately to the smallest change in measurement and set pressures. The system is unaffected by ambient temperature changes and its simplicity of design has resulted in a highly compact instrument. (Overall size $5\frac{3}{16}$ in. by $4\frac{1}{4}$ in. by $3\frac{3}{4}$ in.).

The M/58 provides four control actions: Proportional, proportional-derivative, proportional-reset, and proportional-reset-derivative, and an important feature is the ease with which it may be converted from one to the other, in the field, by simply adding or subtracting standard components and without disturbing air piping or the remote manual operation of the process. The control actions may be adjusted easily and quickly over very wide ranges, the proportional band having a range of setting from zero to infinity while the reset and derivative time is adjustable over a range of 1,000 to 1.

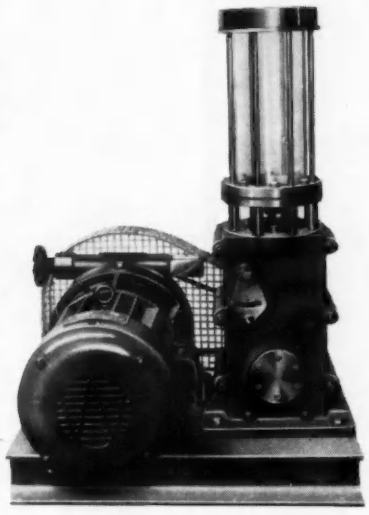
The M/58 may be integrally mounted with the M/53 recorder at the panel or at the valve or elsewhere. The air connections are made either to the back of the M/53 recorder or to a mounting manifold block, and seal valves are provided so that the controller may be removed from service without disturbing the manual operation of the valve or any piping connections. — *Foxboro-Yoxall, Ltd., Lombard Road, Merton, London, S.W.19.*

## British Development

The new free-piston motor car engine announced by General Motors is a direct outcome of their study of British free-piston engine developments. The post-war development of a British free-piston air compressor was sponsored by the Ministry of Supply, the work being carried out by the engineering staff of Alan Muntz and Co., Ltd. This compressor is manufactured by Mackay Industrial Equipment, Ltd., under a Pescara-Muntz licence similar to that now being operated by the General Motors Corporation.

A number of these compressors has been exported and plans are in hand to step-up production to meet the increasing demand from the home and overseas markets.—*Mackay Industrial Equipment, Ltd., Faggs Road, Feltham, Middlesex.*

## Wave Pulse Generator



A new wave pulse generator produced by D. F. Developments, Ltd., known as the Sonomec energy generator, is primarily intended for use in laboratories where the highest standards of apparatus are demanded. It also has obvious uses in other sections of industrial and scientific research.

It is a mechanical vibrator with great variability within the frequency range of 0 to 200 cycles per second. It consists essentially of a mechanically driven disc diaphragm which transmits vibrations to either liquids or solids placed in the 1 gallon capacity processing pot of the apparatus. The linkage mechanism, driven by the 2 h.p. electric motor, incorporates a means of adjusting the amplitude of vibration in an infinitely variable manner. Frequency also can be varied without stopping the machine.

Some applications of the new apparatus in connection with both liquids or solids are: Intense or intimate mixing, impregnation, wetting, emulsifying, separating and segregating, artificial maturing and ageing, and testing to limits of endurance or destruction. It is of great interest to all industries concerned in the research into and improvement of existing products and the development of new ones, and to laboratories, institutions, and other scientific bodies engaged in major research programmes.

In addition to the container for processing liquids, other fitments may be attached so that electrical components, instruments, etc., can be held firmly and vibrated. The vibrations may be arranged at any angle to suit specific requirements. The Sonomec enables accurate experiments to be made to determine optimum frequency and amplitude of vibration, thus allowing a considerable saving to be effected in the capital cost where a large-scale machine is to be installed.—*D.F. Developments, Ltd., 175, Piccadilly, London, W.1.*

# PUBLICATIONS RECEIVED

## 'OUR NATIONAL HERITAGE' — SPORTS AND PASTIMES

Once again the National Benzole Co., Ltd., have produced a most attractive illustrated publication under the title, "Our National Heritage,' which takes as its theme sports and pastimes. The previous two editions, which dealt with the scenic attractions and the places of beauty to be visited, were received with great pleasure by a large number of motorists. No. 3, taking as its theme sports and pastimes, will be equally popular.

The link between 'Heritage' in the title and the text, and the heritage of coal, from which benzole is made, will undoubtedly be appreciated. Copies are available from the National Benzole Company, post-free, on receipt of a post card.—*National Benzole Co., Ltd., Wellington House, Buckingham Gate, London, S.W.1.*

## Brochure Available

To meet demands for further information concerning Plessiflex, the new seamless, flexible, metal hose, Power Auxiliaries, Ltd., have issued a brochure which gives details of potential applications, together with technical data including information on construction and assembly.

Plessiflex is of particular value for the conveyance of liquids or gases at high pressures between junctions which may expand, vibrate, move angularly, or be exposed to high temperatures.

Plessiflex is a continuous, convoluted, seamless, metal tube and is available in various materials including stainless steel, brass, etc. The hose is supplied covered with single or double wire braid according to requirements.

Full details of Plessiflex hose and dimensions are also included in the brochure, copies of which can be obtained from—*Power Auxiliaries, Ltd., Kembrey Street, Swindon.*

## 'Anti-Corrosion'

Describing the company's products designed to wage war on industrial corrosion, the Bitumastic booklet, 'Anti-Corrosion,' is a 20-page illustrated publication providing a great deal of useful information for the maintenance engineer who, as is pointed out in the introduction, is bound sooner or later to be faced with the corrosion problem which costs this country thousands of pounds every year.

Full details of the numerous Bitumastic preparations are given, including the type, method of application, covering capacity, drying time, weight, etc. Details of a complete range of literature for the maintenance engineers are also included.—*Wales Dove Bitumastic, Ltd., Hebburn. Co. Durham.*

# GASFRETS

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- Speedy and accurate bending with minimum of manual effort.
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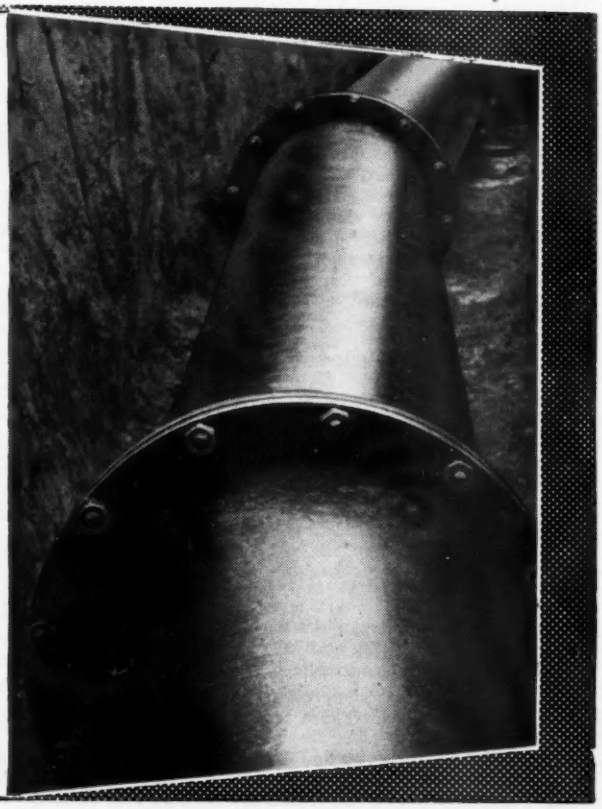

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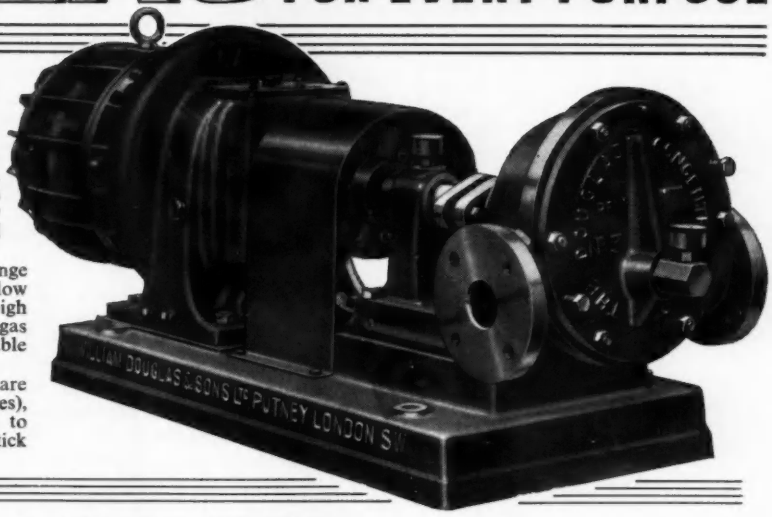


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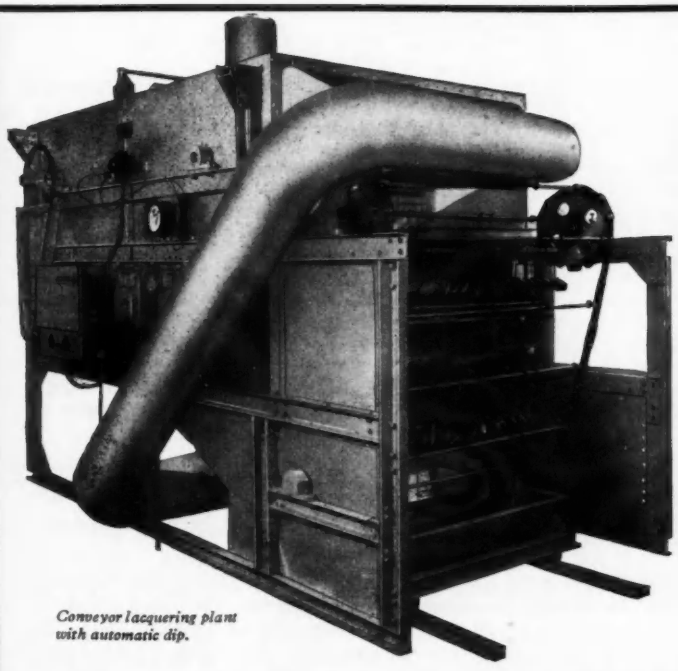

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The "Gas Journal" has existed as an integral part of the Gas Industry since 1849. Unbiased policy, technical knowledge, accuracy and reliability combine with an extensive news service and modern make-up to make the Journal the leading Gas Industry newspaper.

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"Gas Service and Domestic Coke" is the specialist magazine for the Sales and Service personnel of the Industry. It covers all aspects of gas service from the holder to the burner and contains a special large section each month devoted to the utilization of coke. In addition to sound editorials, news items and specially contributed articles, "Gas Service and Domestic Coke" also reports in the fullest possible manner the activities of the numerous Salesmen's Circles, and Solid Fuel Bodies.

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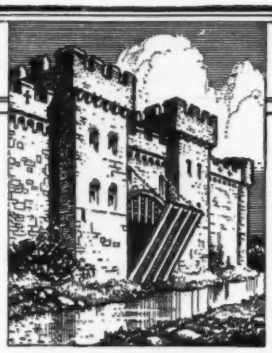

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The "Gas Journal" is published every Wednesday, price **1/6d.**; by post **1/8d.**

**Subscription Rates:** Home and Empire:—**60/-** per annum; Foreign:—**70/-** per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

**Classified Advertisements:** All small classified advertisements are charged at **2/-** per line (approx. **7** words)—minimum charge **10/-**. A Box Number address occupies **2** lines, and a further **6d.** is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

**Displayed Advertisements:** Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received **14** days prior to publication if proofs are required. Type area of inside pages **10** in. deep × **7** in. wide; block screen **120**.

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And fight the Fire Fiend without NU-SWIFT? But why? Even the Royal Navy don't do that. Please send us details of your wonderfully rapid and reliable Fire Extinguishers—BEFORE IT IS TOO LATE!
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Post NOW to Nu-Swift Ltd. 25 Piccadilly W.1.
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## APPOINTMENTS VACANT

### SCOTTISH GAS BOARD

EDUCATION AND TRAINING OFFICER

**APPLICATIONS are invited for the position of** EDUCATION and TRAINING OFFICER on the Board's Headquarters Staff. The Officer will be stationed in Edinburgh, but will be required to visit other parts of Scotland. The salary will be dependent upon experience and qualifications, but will be not less than £1,250 per annum. Essential qualifications include organising and administrative ability, and knowledge of educational and industrial training methods. The successful applicant will be required to pass a medical examination and to join the Board's Superannuation Scheme. Applications, giving details of age, education, qualifications and experience, should be addressed to the undersigned to reach him within fourteen days of the appearance of this advertisement. Applications lodged for this appointment in response to a previous advertisement will be considered and need not be resubmitted.

A. T. HERD,
Secretary.

26, Drumsheugh Gardens,
Edinburgh, 3.

### SCOTTISH GAS BOARD

GLASGOW DIVISION (GLASGOW DISTRICT)
APPOINTMENT OF
METER READING SUPERINTENDENT

**APPLICATIONS are invited for the above appointment.**

Candidates should have practical experience of meter reading and cash collection procedures and in particular with the "Gilbert" System. Ability to control meter reading, prepayment collecting and clerical staff is essential.

The salary for the post will be £985 x 30—£1,135 per annum with placing according to qualifications and experience.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications, stating age, and giving particulars of education, training, experience and qualifications, together with the names of two referees, should be addressed to the undersigned to arrive not later than July 14, 1956.

D. F. YOUNG,
Divisional Controller.

9, George Square,
Glasgow, C.2.

**ESTIMATOR.—Preferably with experience in** Industrial Pipework layouts, required for company with Headquarters in the North West. Apply: No. 285, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

### NORTH WESTERN GAS BOARD

NORTH CHESHIRE GROUP
SENIOR TECHNICAL ASSISTANT (PRODUCTION)—HYDE WORKS

**APPLICATIONS are invited for the above pensionable appointment** at a salary within Grade A.P.T. 8 (£710/£790 p.a.).

The successful applicant will be responsible to the Station Engineer for the supervision and technical control of a Woodall-Duckham continuous vertical retort plant and all other works operations. Applicants should possess the Higher Grade Certificate (Manufacture) of the Institution of Gas Engineers or an equivalent qualification.

Detailed applications, giving the names of two referees, should reach the General Manager, N.W.G.B., North Cheshire Group, Portwood, Stockport, within 14 days.

### WALES GAS BOARD

ENGINEER AND MANAGER—ABERCARN UNDERTAKING

**APPLICATIONS are invited for the position of** ENGINEER and MANAGER of the above Undertaking, which is in receipt of bulk supplies of gas. Candidates for the appointment must have had administrative and sales development experience and possess suitable technical qualifications, particularly in respect of gas distribution.

The commencing salary will be within A.P.T. 12A (£900/£1,025 per annum) in accordance with qualifications and experience.

The successful candidate will be required to pass a medical examination and join the Board's Superannuation Scheme.

Applications, stating age, qualifications and experience, together with details of present and previous appointments, and names of two referees, should be received by the undersigned within fourteen days of the appearance of this advertisement.

C. B. MAWER,
Secretary.

Wales Gas Board,
2, Windsor Place,
Cardiff.

### WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION
VACANCIES FOR TWO DRAUGHTSMEN—
DIVISIONAL ENGINEERS OFFICE

**CANDIDATES should have had experience in** engineering draughtsmanship, structural and building work, and knowledge of gas works plant will be an advantage. They should be capable of carrying out surveys and the preparation of drawings, specifications and estimates. The minimum qualifications expected will be of Higher National Certificate standard.

The salary will be within A.P.T. Grade 8 (£710 x 20—£790 per annum) of the National Salary Scales. The post is pensionable and the successful candidate may be required to pass a medical examination.

One draughtsman will be located at Dudley and the other at Wolverhampton.

Applications stating age, qualifications and experience, together with the names of two referees, should be addressed to Mr. Stanley Jones, Divisional General Manager, West Midlands Gas Board, Kensington House, Bath Street, Dudley, to reach him not later than July 9, 1956.

J. C. INGRAM,
Secretary to the Board.

### WEST MIDLANDS GAS BOARD

NORTH STAFFORDSHIRE DIVISION
CARBONISING ASSISTANT—STOKE-ON-TRENT

**THE possession of the Ordinary or Higher Grade** Certificate of the Institution of Gas Engineers in Gas Manufacture will be an advantage.

Preference will be given to candidates experienced in the operation and maintenance of West's continuous vertical retorts, and conversant with all routine tests appertaining to the working of the plant.

The salary for the post will be in accordance with A.P.T. Grade 7 (£670 × 20—£750 per annum) of the National Scales.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, education and experience, together with the names of two referees, should be addressed to Mr. J. E. Stanier, Divisional General Manager, West Midlands Gas Board, Etruscan Street, Etruria, Stoke-on-Trent, to reach him not later than July 2, 1956.

J. C. INGRAM,
Secretary to the Board.

**DESIGNER DRAUGHTSMAN.—Preferably with** experience in Industrial Pipework layouts, required for company with Headquarters in the North West. Apply: No. 286, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

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**FOR SALE: One Tate Flameproof Solenoid** operated valve, 250 volts 1 phase, 50 cycles, continuously rated, with ¼ in. steam inlet and outlet for 175 lbs. p.s.i. £15. W. H. COLLINGBOURNE & CO., LTD., 1481, Stratford Road, Birmingham 28. 'Phone: Shirley 3303.

**FOR SALE: One Unused STONE 1 kW Steam** Turbo GENERATOR, 100 volts AC, 1 phase, 1,000 c.p.s. suitable for lighting. Steam pressure 100/175 lbs. p.s.i. £50 delivered. W. H. COLLINGBOURNE & CO., LTD., 1481, Stratford Road, Birmingham 28. 'Phone: Shirley 3303.

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(Director, B. T. King, A.I.M.E., Patent Agent) Advice, Handbook, and Consultations free. 146a, Queen Victoria Street, London, E.C.4. 'Phone: City 6161.

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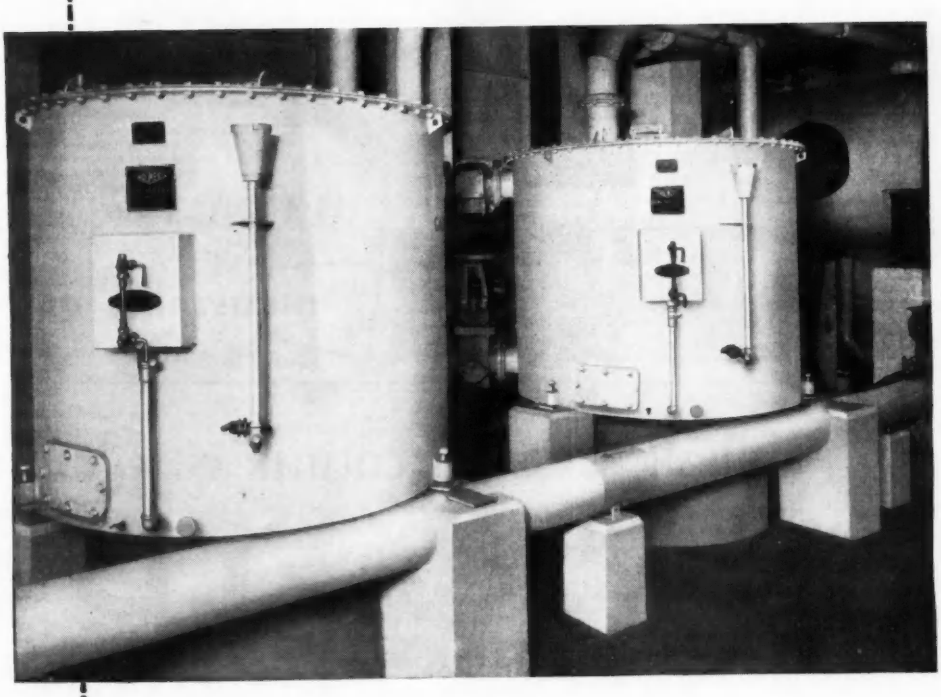

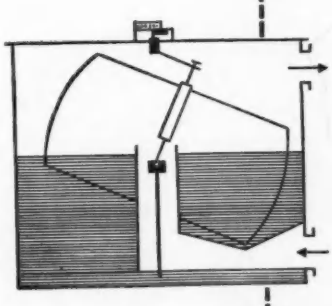

The above illustration shows two B. M. Meters installed at Binns' Store, Sunderland.

**For full details please write for Publication No. 51/5**

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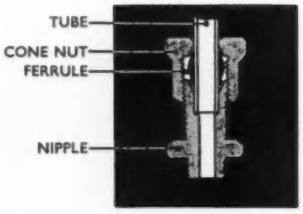
**FOR COMPRESSING AIR OR GAS SUPPLIES USED FOR FURNACE HEATING, METAL MELTING, BRAZING, SOLDERING BITS, LAUNDRY IRONS, ETC.**

**DIRECT COUPLED COMPRESSORS** (see illustration right) are fitted with automatic internal by-pass valves and lubrication systems. They are direct coupled to Keith Blackman motors. Type OA compressors in this range occupy a floor space of only 18" x 7½".
**CAPACITY RANGE:** 100 to 750 cub. ft. of gas or air per hour at 3 lbs. per sq. in. pressure.

**TYPE 4 COMPRESSORS** (not illustrated) are also fitted with automatic internal by-pass valves and lubricators. The complete unit includes motor and drive on a common bedplate, all of Keith Blackman manufacture.
**CAPACITY RANGE:** 500 to 20,000 cub. ft. of gas or air per hour at 3-5 lbs. per sq. in. pressure.
**AREA OCCUPIED:** from 9¼" x 16½" to 61" x 27".

## DID YOU KNOW?

**KEITH BLACKMAN** have been making compression joints for many years and the present design embodies features developed as a result of this long experience. Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.




## serving to burn

*Note: the four burner heads (right) are for high pressure gas, or low pressure gas and air blast.*

**Brass non-blow-off head types:** deal with 5 to 10 cub. ft. of gas per hour.

**Stainless steel, "F" type head, burner:** deals with 8 cub. ft. of gas per hour.

**Perforated head type burner:** deals with 10 to 15 cub. ft. of gas per hour.

**LEFT: "Fishtail" type burner** with two-armed stamped pattern injector for heating liquid in tanks by submerged combustion tubes. For use with low pressure gas supplies.
**Size Range:** 1", 1¼", 1½", 2" and 2½" outlets.
**Capacity Range:** 45-280 cub. ft. of gas per hour.

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**INDUSTRIAL GAS EQUIPMENT**

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*for* HIGH PRESSURE, COLUMN GUIDED

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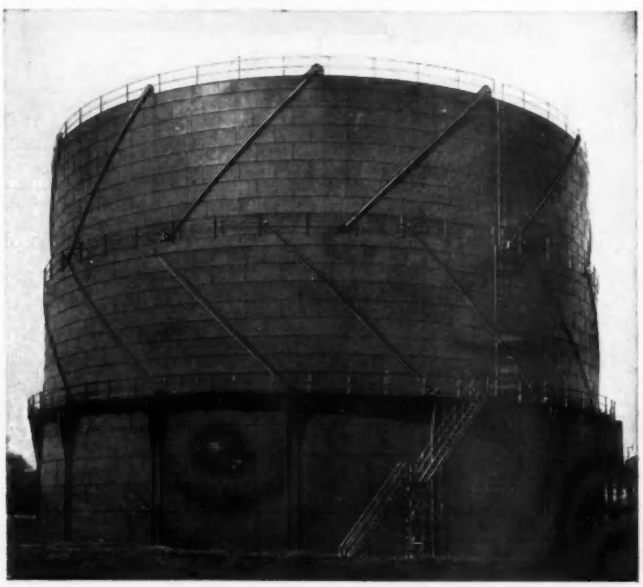

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